Southampton NHS
University Hospitals NHS Trust

Appendix:

Operational Obstetric Anaesthetic Guideline for UHS

Should any medical advice contained in this document vary from that contained within the Obstetric clinical guidance the Maternity guidance should be followed.

Issued: November 2014

Version: 4.0

Scope of this Guideline: -

These guidelines apply to Obstetric Anaesthetists covering UHS maternity services

Obstetric Anaesthetic Guideline

Index

The main Labour ward guidelines (including management of preeclampsia, diabetes, epilepsy, PPH, APH) are to be viewed electronically on the Staffnet to allow regular updates. (There is a hard copy available in the labour ward office and a short cut to this is displayed on the obstetric office computers)

Useful numbers

Obstetric Anaesthetist on call	bleep 2410
Consultant (SpR4) Anaesthetist	bleep 2372
Anaesthetic Coordinator on call	bleep 2265
Obstetric Consultant	bleep 9025
Obstetric Senior Registrar	bleep 2406
Obstetric Registrar	bleep 2411
Midwife Coordinator	bleep 2415

Midwives station	8103
Obstetric theatre (B)	8262
Theatre Office	6310
Day Assessment unit	6303
Anaesthetic office and on call room	8120 / 5188 (office only)
Broadlands	6013 / 6012
Burley	8186 / 8166
Transfusion	4620 (red phone 9-5 pm = ext 3339)
Anaesthetic dept	6283 6720/6135/3670
Recovery	8212
Reception	6030

Anaesthetic guidelines for Princess Anne Hospital

This booklet is intended as a guide for all obstetric anaesthetists in the Princess Anne Hospital. It should be read **prior** to starting the attachment and discussed as appropriate before doing any unsupervised work. Please ensure that you have applied for a HICCS password before starting your attachment (it takes a few weeks to be processed). The forms can be downloaded from the Staffnet at http://sghint20/newintranet/index.cfm?articleid=1106
Training to use the HICCS system will be provided as part of your induction.
Please ensure you have obtained the relevant competency forms. It is trainees' responsibility to ensure that they are completed at the appropriate times.

Note that the latest / official version of these Anaesthetic guidelines is the version on the Staffnet. The Anaesthetic Guidelines should also be used in conjunction with any appropriate Obstetric Guidelines (found also on the Staffnet) so please take a moment to familiarize yourself with these also.

1. Introduction

1.1 Anaesthetic Staff

Consultants
There are 11 Obstetric Anaesthetic Consultants – one is present 0800–1800 each working day

A list of who is covering labour ward/ CSection list is posted on the office wall.

Please contact the Anaesthetic Secretary on 6720 if help is required during daytime hours, for urgent help there should always be a "starred" consultant in PAH theatres.
If help or advice is required out of hours the Anaesthetic Coordinator should be contacted on bleep 2265.
The Anaesthetic Coordinator on bleep 2265 should be contacted at shift handover, and at other times if appropriate, particularly if labour ward is very busy or problems are anticipated. Early communication can avoid a lot of problems.
On call 'Consultant cover' is provided by the General Consultant Anaesthetist on call who can be contacted via the switchboard (ext 100).

There is no separate Obstetric Anaesthetic Consultant on call rota but if there is a specific obstetric problem do contact us via switchboard, as it is likely one of us will be available for advice if the coordinator feels that is necessary.

The general Consultant on call and coordinator should be informed of any transfer to ITU, any severe pre-eclamptic or eclamptic and any patients seen in the MAPP (Medical & Anaesthetic Problems in Pregnancy) clinic with significant problems. For other scenarios see suggestions on notice board.

1.2 Princess Anne Hospital layout

The usual Obstetric theatre is theatre B.
The difficult intubation trolley is kept outside theatre C on the main corridor which is also where the Blood Transfusion Red Phone is. The Blood Fridge is on Labour Ward in the corridor opposite the equipment (clean utility) room. Door combination is 1111
Obstetric patients are recovered in the general recovery area after general anaesthesia. After elective caesarean sections performed under a regional technique mothers are taken to recovery on labour ward. All other regional caesarean sections are recovered in the general recovery (where the midwife will remain with the baby) unless there is prior agreement to transfer the mother back to labour ward

Antenatal and postnatal patients stay in either Broadlands ward on level E or Burley ward (usually high risk) on level F

There is no canteen service in the Princess Anne out of hours; vending machines are sited near the entrance on D level. These facilities are currently not optimal and it might be sensible to bring food in with you. Trainees should remain on site at PAH and not go to SGH site.

1.3 Daily routine

Please ensure your watches are set to labour ward time (either the clock in theatre B or in the main labour ward office which are radio–controlled updated), as accurate timings are vital from the medico-legal point of view.

Trainee hours for the day shift are 08.00 to 18.00.

Anaesthetic handover takes place at 8.00 in the anaesthetic office. The trainee who has done the night shift must hand over directly to the Consultant or deputising senior SpR on weekdays. There is official handover time from 08.00 – 08.30 each morning during which time all on-going cases should be handed over and any difficult cases from the previous night be discussed. The out-going anaesthetist should have recently assessed epidurals in use, prior to handover. A written record of the handover should be kept in the handover book in the obstetric office. Elective sections for the day should be visited prior to the ward round to ensure they are fully prepared. The FBC and antibody status should be checked on the computer, if not recorded in the notes. Theatre equipment should be checked. (There should be two emergency pillows in the cupboard but no woman should be knowingly brought to theatre without the correct pillow)

The morning ward round takes place daily at 8.30 in the main delivery suite office and should be attended by all the Obstetricians and Anaesthetists on duty that day. The senior Midwife on duty presents all the women on the unit before a ward round. Whenever possible the Consultant Anaesthetist and trainee on-call that evening should take an active part on the round but it is not necessary that every anaesthetic trainee attend.

At a convenient time during the morning all women post anaesthetic intervention must be visited on the ward and the follow up form completed. This follow up should still be completed on the weekends & bank holidays and if you do not have the time to do so please call the Anaesthetic coordinator (bleep 2265) to arrange help.

When there is only one theatre available for all Obstetrics, then elective cases should not be started until there is confirmation that no other urgent cases need priority. On the days where there is a separate elective Caesarean list (not in theatre B) then this elective list should start as per routine lists. Note theatre A is the only theatre properly screened for Xray (e.g. planned interventional radiology)

Women for elective Caesarean sections attend the day assessment unit on Labour ward for pre-assessment the working day before their section – where possible they should be seen by one of the trainees on duty the following day. Problems arising should first be discussed with the Consultant on

duty. If there are major issues concerning the management of the case these should be discussed with the consultant who will be in charge of the case where possible.

The afternoon ward round takes place at about 17.00 and trainees working until 18.00 should try to attend .The evening handover takes place at 20.30 with ward round about 21.00 and should be attended by the on-call anaesthetist.

One of the greatest cause of problems in the labour ward environment is failure of communication – it is vital to keep abreast of developments on labour ward by looking at progress on the labour ward board, discussing potential problems with obstetricians and midwives, visiting women with any anaesthetic input on a regular basis and communicating effectively with the theatre personnel.

Any women of high risk of anaesthetic or obstetric complications should be visited early in their labour and a full anaesthetic history taken and a management plan formulated.
Ongoing anaesthetic problems or potential problems should be recorded on the white board in the obstetric anaesthetic office and handed over carefully between shifts.

1.4 Out of hours

There is one theatre team available for emergency work and work must be anticipated and prioritised in discussion with the obstetricians. If a second theatre is required the obstetricians must request additional theatre staff.
Recovery is available until 9pm after which time a member of the theatre team recovers the patients (which may lead to delay between cases.)

Emergency gynaecological surgery should not be undertaken by the obstetric anaesthetist except in life threatening situations (the only exceptions are ERPC's bleeding heavily if labour ward is otherwise quiet and an anaesthetist at SGH is free to come over immediately if required).
Otherwise the gynaecologists should book the case with the centre block theatre Coordinator and the Anaesthetic Coordinator - **an anaesthetist from SGH must come over to do the case.** If the case is not urgent it should be put on the next appropriate emergency or elective gynaecology list at PAH.
The Obstetric Anaesthetist may be contacted to help with post-op gynae problems / gynae cases looked after in recovery. If the obstetric anaesthetist is quiet they can help sort out a minor problem or a more urgent issue whilst the coordinator is being contacted.

The Coordinator must also be contacted whenever the workload increases on labour ward such that one trainee is insufficient to keep abreast of the work - including carrying out the follow up ward visits.
Epidural requests should be responded to within 1 hour of the request for one to be sited.
If epidurals are not working well they need to be attended to promptly and if necessary replaced to ensure good analgesia within an hour.

Please read suggestions for when to inform a senior anaesthetist on the office notice board but this should include any situation which is beyond your usual clinical experience and where you anticipate or are currently experiencing difficulties in patient management/ care.

1.5 Record keeping

Good documentation is vital in obstetric anaesthetic practice. Medico-legal claims cannot be defended if documentation is poor! Particular attention must be paid to documentation of timings, block heights, discussion of risks, adverse incidents and failure of regional analgesia. An anaesthetic chart with predesigned prompts is available which trainees are encouraged to use. Appropriate documentation is still required if the procedure is abandoned (e.g. epidural abandoned as started to deliver) and for i.v. cannulas.

An audit form should be completed for all anaesthetic procedures and returned to the anaesthetic office. The patient details then should be put on the HICCS system.

Serious/ critical incidents should be reported on the UHS incident form and, where appropriate, a full record of events recorded in the notes. (The term critical incident includes all adverse events. We hope that people will not feel threatened by the term but it is important for audit purposes that such information is voluntarily recorded and collated.) Please discuss the event with one of the Consultants who will sign the form. Any incidents of particular anaesthetic interest should also be recorded on the anaesthetic department incident form.

Anaesthetic Follow-up

Follow up of mothers on the post-natal wards allows:

Assessment of analgesia

(e.g. checking adequate analgesia, expert advice, anti-emetics).

Assess satisfactory recovery from anaesthesia / regional analgesia.

(e.g. full recovery sensory/motor/urinary function)

Detection of anaesthetic complications

(e.g. neuropathy, post dural puncture headache).

Any complications should be fully documented in the patient notes and any neurological complications recorded in the book in the obstetric office

Opportunity for further discussion / explanation about anaesthesia / (regional) analgesia provided.

Audit of the anaesthetic workload.

Results of discussion / examination / action plan should be documented in the notes and communicated to the relevant midwife as appropriate.

The aim should be review of women for 2 days following regional blockade and 1 day after general anaesthesia. Further visits may be necessary for unresolved concerns.

1.6 M.A.P.P. Clinic (Medical and Anaesthetic Problems in Pregnancy)

Alternate Wednesday afternoons at 13.30 Outpatient department level E

The senior trainee should attend whenever possible.

Any potential problems or high-risk cases (including women with a BMI > 45 at booking) are referred to the Obstetric Anaesthetists by the Obstetricians. Appointments are made by phoning extension 6016. If the clinics are full sometimes individual arrangements need to be made to see women on the labour ward especially if they are late referrals. It may be helpful to book them into the day unit on labour ward. A card summarising the case and the proposed management is filed in a card index in the anaesthetic office – if you are in any doubt ask for senior help.

Medical and
Anaesthetic
Problems in
Pregnancy

An orange MAPP sticker should be on the inside front of the obstetric notes and on the mothers white notes so that everyone is aware of a potential anaesthetic problem. Please make a note on the card when the woman has delivered and of any procedures performed.

1.7 Meetings

Monday	12:45	CTG meeting, resource room on labour ward,
Tuesday	12:45	Feto-maternal medicine meeting – neonatal seminar room
Friday	13.30	Perinatal Morbidity Mortality 3rd Friday in month Parentcraft room

Every afternoon at 14.30 in the Resource room there is an opportunity to discuss risk incidents from the previous day(s). Obstetricians, Midwives, Anaesthetists & Paediatricians should attend where appropriate.

Governance, Intrapartum Care Committee, Red review, Maternity Services and Clinical Effectiveness meetings may be appropriate for senior obs trainees to experience.

1.8 Teaching and training

Trainees should have obtained an appropriate competency assessment form prior to starting the attachment. Each trainee will be assigned an educational supervisor for the obstetric block as a point of contact if they have any concerns. They should discuss their program with a Consultant (ideally but not necessarily their supervisor) at the start of the block and also to ensure they have a mid-block assessment and end of block signing off meeting. It is the trainees' responsibility to arrange these meetings.

In theatre teaching is largely practically based. Office based teaching will be given by Consultants and senior trainees whenever time allows. It is important to supplement this with additional reading.

During the block trainees should complete one DOP, one mini CEX and one CBD. At the end of each attachment an assessment of each individual trainee will be made.

1.9 Audit and research

An audit form must be filled in for every procedure performed and placed in the tray in the anaesthetic office and data entered into the HICCS system. Trainees interested in running an audit project during their attachment should contact one of the consultants before starting their attachments to help plan it. Once ideas have been developed, please let Hilary Swales have details so as to keep track of all audits taking place at PAH and to ensure appropriate numbers of projects occurring at any one time. Audit projects should be agreed by the appropriate clinical effectiveness/ governance lead and be in line with the Clinical Effectiveness Group. Ideally they should be multidisciplinary and respond to the agreed areas of priority.

There are usually ongoing audit projects but fresh ideas for audit and research are always welcomed. A list of current audit projects and ideas for future ones are kept on the notice board in the office. Encouragement is given to present audit projects at departmental and regional meetings.

On completion of an audit project a full copy of the findings and action should be left in the audit folder in the anaesthetic office.

Raising the Standard: a compendium of audit recipes 1996 2nd editon, published by the Royal College of Anaesthetists and available on their website provides a selection of suitable audits and standards including:

Adequacy of staffing
Timely anaesthetic involvement in the care of high risk mothers
Information about obstetric anaesthesia and analgesia
Pain management in labour
Consent given by women during labour
Response times for provision of intrapartum analgesia and anaesthesia
Monitoring and regional analgesia
Technique of anaesthesia for caesarean section
Pain relief after caesarean section
Monitoring of obstetric patients in recovery and high dependency unit
Airway and intubation problems during general anaesthesia for caesarean section
Audit programme for anaesthetic complications and side effects

1.10 Anaesthetic office

Must be kept locked when empty.
There is a lockable cupboard for valuables in the office.
It is cleaned once per week but should be kept tidy and cups washed etc
– please leave it as you would wish to find it!
Additional tea/coffee supplies to be obtained from the anaesthetic department (ext 6135)

A computer and printer available for use – no new software must be installed
Intranet access is available through the UHS website. All Internet sites visited are logged by the Trust and misuse will lead to this resource being withdrawn.
Login & password as provided. Similarly out of hospital telephone calls from the office are logged – calls should be for hospital business only. For personal calls use a Trust phonecard.

Every month articles of interest should be photocopied by the trainees and placed in a folder. These should then be discussed each month with one of the consultants.
A small library is available but no books should be removed from the office.

1.11 The Labour Ward Guidelines

The anaesthetic guidelines are available on the Staffnet with all the other obstetric guidelines. A shortcut to them available on the labour ward office computer desktop but they can also be found with Women & Children Division, Obstetrics & Gynaecology Guidelines. Although a copy may be printed off for reference please always ensure you refer to the latest version on the Staffnet.

2. Regional Analgesia for Labour

2.1 Indications

Patient request

Maternal cardiac, cerebro-vascular or respiratory disease

Pre-eclampsia

Trial of labour after previous LSCS or uterine surgery

Fetus “at risk” e.g. PET

Breech delivery or multiple pregnancy

Obese patient or other risk factors for GA.

Intra-uterine death or known congenital anomaly of fetus

Contraindications

Maternal refusal

Local or generalised sepsis

Anticoagulant therapy or bleeding diathesis

Uncontrolled haemorrhage or hypovolaemia

Severe spinal abnormality

Some neurological diseases

Lack of trained staff to provide safe care.

If a mother does not have one to one midwifery care from a midwife with the epidural competency she should only be offered an epidural under exceptional circumstances.

There is no numerical limit per se on epidurals running at any given time

2.2 Consent

Usually inappropriate to obtain written consent for analgesia / anaesthesia.

Information should have been given and discussed in antenatal classes.

Mothers should be given the epidural information sheets which are available in the labour rooms and in multiple languages.

Copies can also be downloaded from the OAA website www.oaa-anaes.ac.uk

Consent must be obtained in a manner appropriate to the clinical situation.

No one else can give or withhold consent for the mother.

Ideally mothers should be told about some or all of:-

Post dural puncture headache 1%. If it occurs 80% likelihood of blood patch

Failure to site catheter or achieve perfect analgesia

– usually 10% but higher if obese or any known back problems.

Possible need to re-site catheter – about 5%

Hypotension

Leg weakness

Need for urinary catheter, continuous fetal monitoring

Localised backache for 48 hours due to bruising

– long term backache not caused by regional analgesia

Neurological problems rare (1in 10,000 for temporary or mild neuropathy)

Vertebral canal haematoma, abscess or spinal cord injury extremely rare

Use your discretion as to how much of the above discussion to include especially if the mother in severe pain, but as a minimum specific mention should be made of dural tap and headache and failure of block.

REFERENCES:

1. Kinsella et al. Br J Anaesth 2000;85:311

2. Russell et al BMJ 1996;312:1384

3. Holdcroft et al. Br J Anaesth 95;75:522

2.3 Aseptic technique

Aseptic insertion should include gloves, hat, facemask and gown. Chlorhexidene solution must be used to clean the back.

Drugs must be drawn up directly from the ampoule and checked with another member of staff.

An anaesthetist should attend to place an epidural within 1 hour of a request

Please record the time you are asked to attend and the reason for any delays

Ask for assistance early if you are likely to be busy.

2.4 Epidural.

Continuous infusions / PCEA are the method of choice in mothers likely to require more than 1 hour of analgesia prior to delivery.
Women under midwifery led care must be transferred to obstetric care prior to establishment of regional analgesia.
IV access should be established and an infusion of hartmanns commenced before epidural insertion. No formal preload is necessary and rapid, large volumes of crystalloid should be avoided.

Poor patient positioning is responsible for many failures to site epidurals/spinals and it is worth spending time optimising this before your first attempt.
If using the sitting position:

Place the woman's feet flat on a stool, try to prevent the knees falling laterally.

Ensure the knees are higher than the hips (to reduce the lumbar lordosis)

If sitting on the operating table, tilt the table 5° towards you (to reduce the lumbar lordosis)
If using the lateral position:
Place a pillow under the woman's shoulders

Place another pillow between her knees to prevent the pelvis tilting away from you.

Bags containing 250 mls of bupivacaine 0.1% and 2 micrograms of fentanyl per ml are kept in the fridge in the equipment (clean utility) room.
Standard programme for PCEA pump is 15 ml loading dose then 10 ml per hour infusion with 10 ml patient initiated boluses with 30-minute lockout (set 100 ml 4 hourly limit). Please do not use Bupivacaine 0.25% for routine loading as it causes increased motor block.

The anaesthetist must remain immediately available to attend the mother until the block height is checked 20 minutes after initiation of the block -aim for bilateral block to T10. It may be useful to ensure that the midwife is confident in assessing block height by asking the midwife to check the block with you at this time.
The epidural should be reassessed at regular intervals by the anaesthetist – **do not wait to be called**. If the block height is higher than T7 the anaesthetist should consider whether the epidural infusion should be stopped.

All infusions are continued until after delivery.

If you are having difficulties siting an epidural do not stubbornly persist – consider calling for senior help after 15 minutes of needle attempts

Monitoring

Blood pressure should be documented prior to the epidural and every 5 minutes for the first 20 minutes. After that every 30 minutes.

If the blood pressure falls by >30 mmHg or to < 90 mmHg

Turn the woman into the lateral position

Give oxygen 4 l/min via facemask

Increase i.v.fluids

Give ephedrine if appropriate

(emergency atropine and ephedrine syringes should be present in the room for all women having epidurals)

Block height should be documented

At 20 minutes post insertion by anaesthetist

Every 30 minutes by midwife

Top ups

Top-ups are available from the PCEA programme every 30 minutes. If there is still inadequate pain relief, the block should be checked carefully – it should be up to T10. Unblocked segments may be relieved with 50 micrograms of fentanyl diluted in bupivicaine or saline.

It is important for an epidural to be fully effective so that it can be relied upon to provide rapid anaesthesia for a section if required. If there is any doubt an epidural should be re-sited early rather than multiple top ups being given.

2.5 Epidural trouble shooting guide

1) Failure to thread the catheter. You are probably not in the epidural space. If you think you are try to open up the space with 5 to 10 mls of saline.

2) Blood in catheter. Can be avoided by not inserting the catheter during contractions and inserting a maximum of 4cms into the epidural space (5cm if obese). If you think you have sufficient length of catheter in the epidural space you can try withdrawing the catheter 1 cm and aspirating for blood again. If any doubt exists, it must be replaced.

3) Paraesthesia on insertion of catheter. You should always warn the patient of some paraesthesia during insertion of the catheter. This is usually transient. If the patient complains of persistent paraesthesia you must stop inserting and withdraw both needle and catheter together. This must be documented. Re-site the epidural.

4) Inadequate analgesia. Although regional analgesia is the most effective form of pain relief in labour it is not always perfect – 10% of epidurals fail to work effectively. If asked to review the block in a labouring woman:
Check the catheter site and amount of catheter left in the space as catheters can work their way into or come out of the epidural space - especially important to check if epidural was previously working well. Also consider intravascular placement if block stops working.
Assess the distribution of the block using ethyl chloride spray.
Observe the woman during several contractions and try to establish the site and nature of the painful sensations.
Establish progress of labour and position of baby.

Problems and solutions

- Missed segment - Try a further bolus from the pump while lying on affected side, give a epidural bolus of fentanyl 100 mcg , sometimes withdrawal of the catheter 1cm can help.
- Unilateral block - (a) Pull catheter back so that 2-3 cm remains in space and try further dose. (b) Resite catheter at different space.
- Patchy block - Consider possibility of subdural block. Characterised by a negative epidural test dose followed by an extensive sensory block with motor sparing. Manage hypotension as above. Reassure patient and advise patient of likely rapid regression of the high sensory block after 1 hour. Resite epidural.

Persistent backache – especially if baby in OP position late in labour – try one bolus of 0.25% bupivacaine if block otherwise appears adequate on testing.

If abdominal pain increases and not just associated with contractions a ruptured uterus, although rare, should be considered.

If adequate analgesia hasn't been established within 60 min of attending to troubleshoot persistent pain, the epidural should be re-sited.

If the above approaches fail and the woman is still unhappy, seek senior help.
Persistent pain should be managed with sympathy and explanation.
Poor regional analgesia in labour predicts poor surgical anaesthesia. Have a low threshold for resiting a poor epidural in a woman at risk of Caesarean section.

Unexpected high block / 'total spinal'. Summon senior help.
Patient will require active resuscitation including ventilatory support and aggressive fluid and vasoconstrictor therapy.
No patient should come to any lasting harm from a 'total spinal' if it is managed appropriately.

a) Assess adequacy of breathing – may need immediate intubation and ventilation. May or may not be unconscious – explain / reassure / sedate.
b) Maintain circulation / BP with colloid, ephedrine and / or atropine.
c) Discuss delivery options with senior Obstetrician and Anaesthetist.
d) Cardiovascular and respiratory function may be deranged for up to 48 hours. May need ITU management.
e) Treat as for dural puncture.
f) Full discussion with patient, including explanation and apology.

2.6 Treatment of local anaesthetic toxicity

See also departmental guideline Intralipid 20% to treat Local Anaesthetic Induced Cardiac Arrest

PREVENTION:

- Do not exceed toxic dose limits
- Aspirate before injection.
- Inject slowly while watching/talking to patient

DETECTION:

- Numbness of tongue and mouth, tinnitus, oscillopsia, slurred speech, muscle twitching, irrational conversation, anxiety or feeling of impending doom
- Hypotension, dysrhythmias, convulsions (convulsions may not precede CVS toxicity, especially with bupivacaine).
- Cardiovascular collapse.

TREATMENT OF SEVERE CVS TOXICITY:

- Oxygenate and ventilate immediately

(hypoxia & acidosis will develop extremely quickly; this will make the toxicity worse).

- External cardiac massage, uterine displacement, immediate Caesarean section if cardiovascular collapse persists.

Due to the high affinity of bupivacaine for cardiac tissue, prolonged resuscitation efforts will be required. It is not clear whether repeated defibrillation attempts should be made whilst serum bupivacaine levels remain high Amiodarone 150mg over 10 minutes is probably the drug of choice.

Treatment of Cardiac Arrest secondary to Local Anaesthetic Toxicity:

Commence CPR and follow the appropriate ALS algorithm.

Take 100ml bag 20% Intralipid (kept on the resus trolley) infuse 100ml i.v. stat.

Start a continuous infusion of approximately 0.25ml/kg/min until haemodynamic stability is restored

Kept in wall cupboard theatre B anaesthetic room behind intralipid guideline

If no Return of Spontaneous Circulation (ROSC), 100ml bolus can be repeated twice more at 3-5 min intervals.

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2.7 Spinal

Indication: need for very rapid onset of analgesia, including a mother who is severely distressed , prior to siting epidural.

Onset of analgesia usually within 5 minutes. Duration is quite variable from 30 to 90 minutes but will wear off suddenly. Use 24 or 25G pencil point needle.

“Classical mixture” is 1ml 0.25% Bupivacaine + 25mcg Fentanyl made up to a volume of 2.5ml but 2.5 to 3 ml of epidural infusion mixture works

(**Do not use stronger spinal mixtures on the labour ward**).

2.8 C.S.E.

Indication as for spinal.
May place epidural either at the same time as the spinal or when analgesia has been achieved. Catheter has not been tested so anaesthetist will need to attend at short notice when spinal wears off, as the anaesthetist must put in the first dose.

2.9 Remifentanil PCA as an alternative to epidural analgesia

Indications – for use when epidural analgesia contraindicated and other forms of analgesia are insufficient. Should always be discussed with Anaesthetic coordinator or other senior anaesthetist. **See appendix 7.4 for full guidelines**

A midwife must be present in the room at all times during usage.

Entonox can be used in addition to remifentanil.

Diamorphine PCA is useful for IUD. A loading dose of 2.5mg diamorphine should be given. A bolus dose of 0.5mg in 1 ml should be given with a lockout time of 5 minutes.

2.10 Coagulation and Regional Analgesia

If in doubt discuss with a senior anaesthetist and/or a haematologist.
Every situation needs an assessment of risks and benefits.

Platelets.

If there is any clinical suspicion of impaired platelet function or prolonged bleeding avoid regional anaesthesia.
Platelet count may fall in PET or in Thrombocytopenia of pregnancy. Discuss the risk / benefit of procedure with more senior anaesthetist if platelet count below 100. As a general rule trainees should not perform regional anaesthesia if the platelet count is below 80×10^{-9}/l

Clotting.

A clotting screen must be checked and INR / APTR 1.2 or below prior to regional anaesthesia if:

- there is any clinical suspicion of a bleeding tendency
- there is any reason to suspect liver dysfunction (e.g. cholestasis with abnormal ALT and no recent clotting result)

An INR 1.2-1.4 may still be reasonable for regional anaesthesia but should first be discussed with a senior from a risk benefit point of view.

$^{1}/_{3}$ of mothers carrying haemophiliac babies (Boy) will have a low Factor VIII (haemophilia A). If mothers pre-pregnancy levels have been done and are normal then OK to not recheck. Most only checked during pregnancy. If at 34 weeks level checked and are 50% or above normal levels then OK to proceed with regional and not recheck. Haematologists advice that levels will not drop further after this stage. If no 34 week levels then repeat Factor VIII levels after discussion with haematologist. The Obstetricians will be wanting to avoid ventouse so may have early recourse to LSCS.

In significant PET a platelet count should always have been checked **within 6 hours** of a block or more recently in rapidly progressive disease. Clotting screen is only needed if there is evidence of liver dysfunction.
Consider coagulation abnormalities also in abruption, fetal death and amniotic fluid embolism – if in doubt seek senior advice.

Patients on aspirin the risk of a spinal or epidural haematoma does not appear to be increased.
Caution if patients on clopidogrel (thienopyridines) and abciximab (GpIIb/IIIa receptor antagonists) however - haematology advice and senior anaesthetic input needed.

Patients on Heparin

Patients who are **fully** anticoagulated (either with high doses LMWH or intravenous infusion) – regional anaesthesia is contraindicated. If unfractionated heparin is discontinued for labour or a caesarean section then a normal APTR result should be achieved before using a regional technique. If fully anticoagulated with Clexane (enoxaparin) e.g. 1mg/kg b.d. based on early pregnancy weight), 24 hours should elapse before siting (or removing) an epidural or spinal – monitoring of anti-Xa levels is not predictive of bleeding risk. (American Society of Regional Analgesia)

Patients on **prophylactic** anti-thrombotic regimens (beware possible thrombocytopenia that can occur with short term or long term use. HIT is in fact classically associated with recent initiation of LMWH

Unfractionated heparin*:* 5000 units s/c (7,500 units in pregnancy) BD

Wait 6 hours after last dose before performing block or removing catheter.

Subsequent or first dose of heparin at least 4 hours after epidural insertion or removal of epidural catheter.

Low molecular weight heparin (LMWH*)* e.g. clexane (enoxaparin) 40 mg o.d.

Wait 12 hours after last dose before performing block or removing catheter.

Subsequent or first dose of heparin at least 4 hours after block insertion or removal.

The following **symptoms may be indicative of an epidural haematoma** and must be reviewed urgently by the anaesthetist.

New back pain

Localised tenderness

Root pain

Altered sensation

Weakness/paralysis

2.11 Sepsis and regional analgesia

A relative contraindication to regional analgesia is generalised sepsis as there is the potential risk of epidural abscess formation. Each case must be viewed on a risk / benefit basis looking at temperature, white cell count and general evidence of sepsis versus the perceived benefits of a regional technique.

A woman with a temperature of 37.5 C and looking well should be able to have regional analgesia, whereas one with a temperature of 38 C, and rigors should not except on the very rare occasions where a serious benefit can be demonstrated e.g. anticipated airway difficulties if general anaesthesia required.

A spinal is less likely to produce problems compared to epidural insertion so should be considered in preference where appropriate. If in doubt discuss with a senior anaesthetist.

2.12 Back pain/ abnormal neurology

Back Pain Is Common.

Low back pain is present in 50% in pregnancy (c.f. 15% non-pregnant).

In the majority of women symptoms disappear within 6 months of delivery.

Back Pain can be prolonged, 20% still have back pain at 6 years, particularly those with backache in a previous pregnancy.

Women with abnormal neurology or troublesome backache after regional anaesthesia / analgesia should be discussed with a consultant obstetric anaesthetist prior to leaving hospital to allow review. Follow-up arrangements may include telephoning at home, review on the Labour Ward or in the MAPP clinic and details should be copied in a letter to the GP.

2.13 Inadvertent Dural Puncture

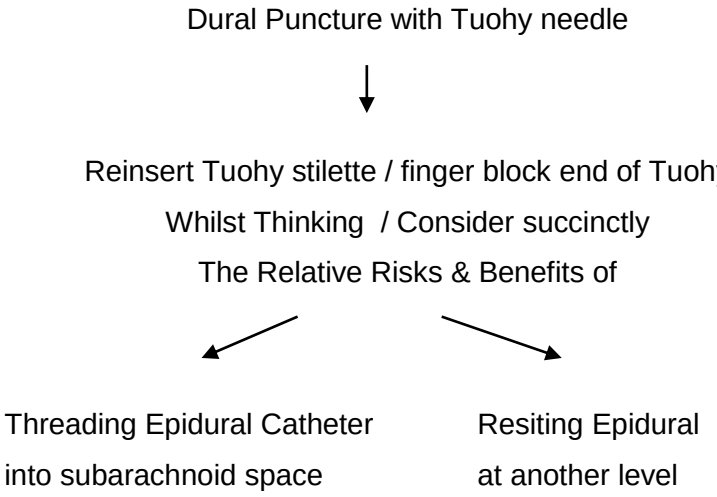
See also: Regional Anaesthesia and accidental dural puncture - guideline

Must be carefully audited, a rate of $\leq$ 0.5% is our aim.

Please record any inadvertent dural puncture in the neurology book.

A consultant must be informed as soon as appropriate (e.g. at handover).

The mother's GP and her community midwife must also be informed (so obtain details from woman/ notes), for which we have a standard letter. It is important to discuss (and document) with the mother and midwife what has occurred and the expected plan.



Situation 1 Situation 2

Considerations include: difficulty of insertion, necessity for regional blockade, obstetric & anaesthetic risk factors and staffing levels
Discuss with a more senior anaesthetist at the earliest opportunity.

Situation 1 (also when CSF flow back down epidural catheter despite no obvious dural puncture with Tuohy)

Dural puncture is diagnosed as free flow of CSF through epidural catheter OR free flow of CSF through Tuohy needle and then the epidural catheter is threaded through. It must not be advanced if pain or persistent paraesthesia is experienced. No more than 4cm of catheter should be threaded into the subarachnoid space.

In this instance analgesia for labour can be achieved by using intrathecal drugs, a mixture of local anaesthetic and opiate. Use 2 – 3 ml of the 0.1% bupivacaine, fentanyl 2 mcg/ml epidural mix injected through the catheter as an initial bolus then 1 ml increments as required to achieve pain relief.
If the mother requires a Caesarean section give 2 ml of 0.5% hyperbaric bupivacaine down the catheter in increments. (remember to account for the deadspace remaining in the epidural catheter.)
The intrathecally placed catheter must be labelled as such and be dressed to prevent easy access. Intrathecal infusions should not be used. All intrathecal drugs should be administered with particular regard to sterility and must be given by an anaesthetist. The catheter may be left in situ after delivery only if coagulation is abnormal.
This is now probably regarded as the preferred management rather than resiting an epidural.

Situation 2

The dura has been punctured but the epidural needle has been removed.

An epidural catheter is sited at an adjoining space. Remember the chance of a second dural puncture can now be up to 10% so senior help may be required.

Remember that in the presence of a dural puncture the amount of local anaesthetic required may be significantly less than for an epidural with intact dura. This is particularly important when an epidural is being topped up for a caesarean section.
Analgesia should be established with an initial bolus of 15 mls of the 0.1% bupivacaine and fentanyl 2mcg / ml mix. After 20 minutes the block should be checked and the bupivacaine /fentanyl mixture as above commenced at 10 mls per hour, No PCEA function should be programmed. No boluses must be given other than by the Anaesthetist.

The Anaesthetist is fully responsible for the epidural in these women and must regularly check the patient to ensure that there has been no intrathecal spread of the local anaesthetic solution resulting in a high block
The Midwife must be reminded to monitor the level of blocks and motor block at least every 30 minutes and call the Anaesthetist if the block is intensifying or rising.

The mother can be allowed to push during the second stage but this active phase of the second stage should not be prolonged beyond 45-60 minutes.

If the mother requires a Caesarean section it should be carried out under epidural top-up with smaller increments than normal (e.g. 3mls 0.5 % bupivacaine) over 30 minutes. If this time scale is too long consider general anaesthesia.

If the epidural was difficult to insert it may be appropriate to leave the epidural catheter in situ for 24 hours to allow anaesthetic follow-up review and possible epidural blood patch – discuss this with a Consultant first.

Management of postdural puncture headache (PDPH)

N.B. Post-dural puncture headache can occur after an apparently uneventful sub-arachnoid block with a pencil point needle.

Post dural puncture headache typically appears one to four days following the dural puncture (occasionally later). Pain can manifest itself as frontal or occipital headache or as severe neck ache, sometimes associated with meningism.

The mother should be encouraged to gently mobilise during the initial 24 hours post delivery. Regular analgesia should be prescribed and attention given to maintaining hydration, posture and avoiding straining.

About 80% of women develop significant headache after inadvertent dural puncture and 70% of these require blood patching.

It is important that a careful diagnosis of post dural puncture headache be made. Inadvertent dural puncture may not be recognised at insertion in up to ¼ of cases.
The pain is classically relieved by remaining in the supine position and is exacerbated by assuming the upright position. Abdominal compression, performed by standing behind the patient and squeezing tightly on her anterior abdominal wall, should in most cases transiently reduce the headache.
If 24 hours after the dural puncture the mother has a significant headache a blood patch should be considered and discussed with the mother.
Success of epidural blood patch is 70% after 24 hrs (compared to 10% if <24hrs and 90% if >48hrs) but long-term symptoms may recur / persist.

Failure to treat a postdural puncture headache can cause significant problems including
Persistent headache & hearing changes
Sixth nerve palsy (occasionally IInd / Vth / VIIth / VIIIth nerve)
Sub-dural haematoma
Intra-cerebral haemorrhage
CSF fistula and seizures.

Epidural blood patches have been associated with
backache (occurs in 20% for a few days)
lumbo-vertebral syndrome
meningeal irritation
repeat dural puncture (in region of 10%)
but not a reduction in effectiveness if subsequent epidural required.

The mother should also be carefully observed for signs of infection and or pyrexia.

The mother should be advised to return to labour ward in the event of further problems following discharge from hospital. They should be offered an appointment in the MAPP clinic in 3 – 4 months. A letter should be written for each patient (proforma on computer) a copy for the patient and a copy for the GP. Details of follow up, findings and management need to be updated for each patient on their HICCS record.

2.14 Epidural Blood Patch Procedure

The mother should remain horizontal for approximately 2 hours prior to the blood patch so as to minimise the leak and ensure that the epidural space is free of cerebrospinal fluid. She should also be advised to remain horizontal for 4 hours post patch so she can arrange someone else to help feed the baby. Best to patch on their bed to minimise movement (trolley to bed after patch can be a factor in destabilising the blood clot)

Written informed consent should be obtained. A consultant must have at least discussed the case.
Coagulopathy and sepsis are relative contraindications to epidural blood patch – must be discussed with a consultant first.
Epidural blood patches are usually performed in theatre / anaesthetic room. The anaesthetist performing the epidural should be a senior Specialist Registrar or Consultant.
A tourniquet is placed on the patient's left arm positioned so that it does not encroach on the antecubital fossa. Both the anaesthetist performing the epidural and the venesector must scrub fully with gown, mask, gloves and hats.
The venesector places a sterile paper under the patient's arm, paints it generously and covers the lower forearm with sterile drape.
After the Anaesthetist performing the epidural has located the epidural space (preferably at/ or 1 space below level of dural puncture if possible) the venesector should take 20 ml of blood aseptically and pass the syringe to the other Anaesthetist.

The blood should be injected slowly into the epidural space. It should go in very easily. The patient may complain of discomfort and a tight feeling in the legs. Slow down or pause but aim to inject a minimum of 15 ml. The procedure must be stopped if resistance to injection or pain.
Before the Tuohy needle is removed, 1 ml of saline should be injected from the loss of resistance device to minimise entry of blood into the needle track which can cause back pain.

After applying adhesive spray and dressing the mother should be turned supine. She should remain supine for at least two hours. Thereafter she can gradually be raised to the sitting position but should aim to keep the lumbar spine straight or lordotic.
The mother should be advised to try to avoid coughing and straining and have easy bowel actions (e.g. lactulose may be required). The mother should be advised to try to keep her back straight and not to stoop down or lift heavy objects for two weeks.

2.15 Fasting guidelines

Labour.
Mothers may take a light diet while in normal labour. Fizzy drinks should be avoided.
If labour becomes abnormal then the mother should be restricted to water only (clear fluids permissible if dilute and able to read print through glass). This will include augmentation of labour, regional analgesia and administration of parenteral opiates.

Caesarean.
Mothers for elective procedures should be starved for 6 hours for food and 2 hours for water (i.e. can/ should drink water till 0700) Non-elective cases should be starved for the same periods if clinically appropriate.

Mothers should not eat after delivery until they have delivered their placenta, been sutured if needed and thought to be at low risk of bleeding.

2.16 Antacid Prophylaxis

High risk labour –
Ranitidine 150 mg should be given to all mothers who are on a continuous CTG and those mothers with a BMI greater than 40. This should be given as early as possible and continued 6 –8 hourly throughout labour.

For emergencies procedures -
If Ranitidine has not already been given it should be administered by slow i.v. bolus (50mg) by the Anaesthetist as soon as possible. Sodium Citrate 0.3M 30ml should be given in the Anaesthetic Room if a GA is planned.
Elective CS.

Ranitidine 150mg p.o. the night before.
Ranitidine 150mg p.o. + Metoclopramide 10mg p.o. at 07.00
Sodium Citrate in the Anaesthetic Room if appropriate.

2.17 Crossmatching Guidelines

Patients are not routinely cross-matched before theatre. **A recent antibody screen result must be checked** and a sample should be sent to the lab for screening and held in the lab. Anyone with previous antibodies must be cross –matched.
Blood can then be issued rapidly according to the clinical need.

The Red Phone outside theatre B should be used during office hours to contact transfusion urgently. This facility must not be abused. If there is substantial obstetric haemorrhage a **pink card** labelling the blood as urgent must be placed in the bag with should be used for samples to ensure they are given top priority.
Ongoing bleeding or coagulation problems must be discussed with the **Consultant** Haematologist.

Circumstances that warrant requesting preop cross match include:
existing haemorrhage
existing anaemia
likelihood of excessive intra-operative blood loss
known presence of antibodies in the past- even if not detected in most recent sample.

There have been some delays getting blood and blood products over to the Princess Anne Hospital on occasions – anticipation of need is important.

O negative blood
Four units are kept in the blood fridge in the Princess Anne for very urgent need when there is insufficient time to wait for group specific blood.
The accompanying form must be returned to blood bank as soon as possible to allow supplies to be replenished.

It is important that all samples sent to the BT lab are correctly labelled or they will be rejected. The patient's Forename, Surname, date of birth and hospital number/NHS number - 4 points of identification- must be exactly the same on the request card (use PAS addressograph label), sample tube (hand-written), patient wristband and PAS (if not using PAS addressograph label)

3. Caesarean Section

Regional anaesthesia for Caesarean section

See also: Caesarean Birth: Guideline

It is vital with all caesarean sections that the Obstetrician communicates the degree of urgency to all staff. The Obstetrician is not responsible for choosing the method of anaesthesia. It is the responsibility of the Obstetrician to organise transfer of the patient to theatre.

3.1 A suggested classification of urgency is:-

Category**1** Immediate –Maternal or fetal compromise that places life at risk e.g. Severe prolonged fetal bradycardia, uterine rupture, acute abruption, cord prolapse.

Category **2** Urgent – Maternal or fetal compromise that is not immediately life-threatening.

Category **3** Early – No maternal or fetal compromise, but needs early delivery

Category **4** Elective – Delivery timed to suit woman and staff

Category 1 sections should be delivered within 15 minutes and category 2 sections within 30 minutes of the decision to deliver being made. It may occasionally be appropriate for the delivery to occur just outside these standards (e.g. epidural top up for Category 2 section) where the risk of general anaesthesia has to be considered against a epidural which is expected to be adequate but just falls outside 30 minutes to achieve this. This needs to be agreed with the Obstetrician and the discussion documented.

From the medico-legal point of view it is important to document the time you were called, the category given by the obstetrician, the time of delivery and the reasons for any delays.

For all emergency caesarean sections, the patient must be transferred to the operating theatre as soon as possible, with fetal monitoring continuing until abdominal skin preparation. (It may not be possible for the CTG to be recorded continuously whilst a spinal is sited – it is then not unreasonable for a few minutes without CTG recording if the obstetricians are aware)

Category 1 and 2 sections should be taken to theatre directly on the bed.

With no existing working epidural, category 1 sections will usually require general anaesthesia.

Regional techniques are to be preferred whenever possible time permitting.

Caesarean section pathway - This has been designed in order to ensure high risk women are ready for theatre should an urgent section be required.
All women who have continuous CTG should be included in this group and women with BMI > 40.
A list of actions should be completed early including giving ranitidine 6 hourly, staff changing into theatre clothing, woman in hospital gown.
It has been shown in our audit that women on the pathway arrived in theatre for a cat 2 section on average 5 minutes quicker thus allowing 5 minutes longer for the anaesthetist to provide a good quality regional block. This should reduce the number of GA sections especially in those who have an epidural already sited and conversions to GA for inadequate blocks.

3.2 Regional techniques

Advantages

- Enables maternal participation at delivery, and support from partner
- Safety
- Avoids risk of failed intubation
- Reduced risk of acid aspiration
- Avoids morbidity from GA drugs – fetal and maternal
- Avoids potential for (unintentional) awareness
- Good postoperative analgesia
- Earlier breast feeding – neonate more alert
- Earlier mobilisation

Less postnatal depression

Absolute contraindications

Patient refusal (assuming you have fully explained the risk/benefits)

Local sepsis at the site of needle insertion

Relative contraindications

Hypovolaemia – uncorrected

Cardiac disease with relatively fixed cardiac output

Coagulopathy / thrombocytopenia

Placenta praevia – consult with surgeon and senior anaesthetist.

Beware LSCS in **placenta praevia** and **previous LSCS**

risk of acreta or percreta and torrential haemorrhage.

Neurological disease – there is no absolute contraindication in currently available evidence. Deterioration post delivery most likely to be natural progression of the disease.

Previous back surgery – may make insertion difficult. More likely for patchy epidural block. Subarachnoid block should not be affected. If time permits the level at which surgery was performed should be confirmed and this level avoided if possible – it is not always clear from the scar. Not a contraindication, but a senior anaesthetist should be involved.

Spina bifida 50-70% of hairy naevi have underlying cord abnormality, in meningomyelocele 15% have tethered cord syndrome (which excludes use of spinal anaesthesia)

Cord prolapse, abruption or severe fetal distress may preclude the use of regional techniques for emergency LSCS due to the urgency of delivery. Sometimes, the Obstetrician in charge of the case may recommend the technique you use.

Back pain – to reiterate there is no evidence that regional anaesthesia exacerbates pre-existing back pain or causes new back pain.

Available techniques

Epidural

Spinal(subarachnoid)

Combined spinal epidural (C. S. E)

Preoperative visit

History, examination

Discuss options

Explain procedure and potential complications

Consent

Antacid prophylaxis

Discuss postoperative pain relief options

OAA Guidelines:

You must record in the notes or on the anaesthetic chart that you have explained to the patient that regional techniques do not abolish all sensation, but should abolish pain. Reassure that if unpleasant sensation occurs, alternative manoeuvres may be used, which might result in the administration of a general anaesthetic (in which case the partner would have to leave).

The most common cause of litigation relating to LSCS under regional anaesthesia is discomfort during the operation.

It is important to warn the mother that there is about a 10% risk of failing to get an existing epidural working adequately for caesarean section and that the conversion rate for regional emergency sections is 3-5%.

3.3 Monitoring

'Minimum standards in obstetric anaesthesia' include:

'Continuous pulse oximetry, non-invasive blood pressure capable of automatic one minute cycles (and preferably a printout) and continuous ECG are required for operative delivery under regional block, during induction, maintenance and recovery.

The fetal heart rate must be recorded during initiation of regional block for operative delivery and until the abdominal skin preparation in emergency LSCS. During general anaesthesia continuous inspired oxygen and end-tidal carbon dioxide concentration must be monitored as well as pulse oximetry, non-invasive blood pressure and ECG.

3.4 General points for Caesarean under regional

It is important before an Anaesthetist embarks on any caesarean section that they check the consent form, whether there are any maternal antibodies that might interfere with rapid cross-matching and where the placental site is on the scan.

I.v. access is first secured with a 14g or 16g cannula, and intravenous preload is started with1000ml crystalloid (while the epidural is being inserted)

Once the block has been sited, position the patient supine with left lateral tilt or wedge.

Oxygen is not routinely given but can be given by facemask as dictated by pulse oximetry – oxygen should be given from the separate oxygen cylinder in theatre rather than disconnecting the anaesthetic circuit from the common gas outlet.

Treat hypotension aggressively with intravenous fluid and ephedrine/ phenylephrine increments

3.5 Testing block height

It is important to check the lower level of block (i.e. to S4 perineal/ perianal) as well as the upper in order to achieve adequate surgical anaesthesia. The upper level should be at least T4 to cold, ideally T2/3 and touch to T5 . If the epidural (or spinal) is established in the lateral position, the sacral segments may be missed. It may be necessary to supplement the block with a caudal.

A good motor block must be confirmed. An apparently good sensory block but good movement of the legs probably will not be a good enough block for surgery

Document the level of block obtained and the adequacy of perioperative analgesia.

3.6 Epidural technique

Advantages	Disadvantages
Easy to top up labour ward epidural	Slow onset
Stable BP	Large doses of LA
Intra-operative manipulation possible	Poorer block quality than spinal
Can be used for postoperative analgesia	

Indications

Women who already have epidural sited for labour

Severe pre-eclampsia (coagulation permitting)

Specific maternal disease (e.g. cardiac) where rapid changes in systemic vascular resistance (from spinal or GA) might be problematic

Procedure

Epidural catheter sited at L2/3 or L3/4 interspaces

A block to T2-4 to cold is established using incremental doses of 0.5% bupivacaine, given in boluses of 5ml until adequate anaesthesia is achieved. 100mcg fentanyl should be added to the first 20ml. No more than 150mg of bupivacaine (equivalent to 30ml of 0.5%) should be given.
(As an alternative 20mls 2% lidocaine with 1:200,000 adrenaline (i.e. 1ml of 1:10,000) plus fentanyl 100mcg can be given as two x 10ml boluses at five-minute intervals. (turning the patient from left to right lateral between boluses, or with the patient in the supine / wedge position). If after a further 10 minutes, the block is inadequate, further boluses of 5ml local anaesthetic may be given (WITHOUT fentanyl)

The onset time of adequate analgesia should be the same for either technique, and remember that bupivacaine has a longer duration of action than lidocaine, and is the preferred technique.
Diamorphine 2.5mg may be added to the epidural at the end of the operation.

LSCS with an epidural in situ.

Top-up depends on time available, and adequacy of analgesia already achieved.
0.5% bupivacaine 20-30ml in boluses of 5–10ml is the preferred technique. An initial bolus of 10ml should be given, followed by further increments. The top-up should contain 100mcg fentanyl prior to surgery. Ideally the top-up should only be given in the operating theatre, but if the urgency dictates, and in the interests of avoiding a GA, it is permissible to commence the increments in the patient's room, **ON THE CONDITION THAT YOU MAKE IT YOUR PERSONAL RESPONSIBILITY TO ACCOMPANY THE PATIENT TO THEATRE**

(2% lidocaine, with 1:200,000 adrenaline 20mls, with 100mcg fentanyl is also permissible)

3.7 Spinal technique

Advantages	Disadvantages
Rapid onset	Single shot
Good quality analgesia	Limited duration
Easy to perform	Inadequate analgesia difficult to correct
	Rapid changes in BP and cardiac output

Most commonly used technique for elective LSCS

Technique

Dural puncture is performed at L3/4 or L4/5 using 24g Sprotte or 25g Whitacre – patient sitting or in lateral position.

2.5–3.0ml heavy bupivacaine is injected, checking for aspiration of CSF before and after injection.

Opiate may be added, which will greatly enhance intra-operative and postoperative analgesia, e.g. 0.25 mg diamorphine, or 25 mcg fentanyl. Diamorphine is currently prepared by pharmacy 0.25mg in 0.25mls saline. The outside of the syringe is not sterile so the contents must be drawn up as if from an ampoule.

3.8 Combined Spinal / Epidural

Advantages	Disadvantages
Rapid onset	Rapid change in BP & cardiac output
Good quality analgesia	Technically difficult
Intra-operative manipulation possible	Higher failure rate of spinal injection
Epidural can be used for postop analgesia	Untested epidural catheter

Indications

Prolonged surgery

Requirement for epidural postoperatively

If limiting the speed of onset is required(e.g. cardiac disease) a small intrathecal dose of LA can be supplemented through the epidural catheter as needed.

Technique

The intrathecal injection may be performed by passing the spinal needle through the Tuohy ('needle through needle') or via completely separate needle placement, either at the same or a different interspace.

Needle through needle is associated with higher incidence of failure to locate the subarachnoid space, but only requires one injection. If a two-injection technique is used, the epidural is usually sited first, avoiding the potential time delay for its insertion with an evolving subarachnoid block.

With either technique, subarachnoid block should not be attempted above the L3/4 interspace because of the risk of spinal cord damage.

Needle through needle

After locating the epidural space, pass the spinal needle (usually a long 25g Whitacre) through the Tuohy. A “pop” or “dural click” is usually felt as the spinal needle pierces the dura. Immediate flow of CSF is usually seen at the hub of the spinal needle. Do not advance the spinal needle any further. Grip both the hub of the spinal needle and that of the epidural needle so that the spinal needle does not move during injection. Once CSF is aspirated, inject heavy bupivacaine with or without opiate, as for spinal anaesthesia. It is not necessary to aspirate during the spinal injection since the spinal needle may move out of the subarachnoid space. Stop injecting immediately if the patient reports pain or discomfort.

Thread the epidural catheter, check carefully for the absence of CSF therein, and secure in place. It is important not to take too long managing the epidural catheter otherwise a saddle block will develop – ideally place the woman on her side before checking and securing the catheter.

If blood cannot be cleared from the catheter or an epidural catheter cannot be threaded, then place the woman in the lateral position and try again.

Two needle technique

Having inserted an epidural catheter, perform a spinal at L3/4 or below, with a 25g or smaller pencil-point needle.

With either technique, remember that the epidural catheter remains untested until the subarachnoid block starts to recede (unless the epidural is tested before inserting the spinal in the two needle technique). Nevertheless, it is reasonable to top-up in theatre – beware opioid top-ups at the end of the procedure.

If the block is inadequate in the anaesthetic room, injecting further local anaesthetic (may be a larger than expected effect) or saline down the epidural catheter will compress the dural sac and may cause cephalad spread of intrathecal local anaesthetic.

3.9 Spinal anaesthesia after failed epidural

There is an increased incidence of high block when giving a spinal anaesthetic in this situation. If this anaesthetic has been chosen then there must be increased vigilance for high block.

If the epidural has failed and the last epidural top-up was more than 45 minutes before, then a usual spinal dose 2.5ml heavy bupivacaine can be used.

If the epidural has failed after a recent epidural top up on labour ward, then because fluid in the epidural space compresses the CSF and reduces its volume, a reduced spinal dose or a CSE must be considered if this technique is employed – depending upon the strength and volume of top up. The mother should be positioned with an extra pillow or wedge behind her shoulders and head and anaesthetist prepared to have to induce general anaesthesia in the event of a high block.

This practice is controversial-

It should only be performed under the supervision of a senior anaesthetist.

Risks:

Theoretical damage to the epidural catheter

Increased risk of dangerously high block

Fluid in epidural space forcing intrathecal LA cephalad

Epidural LA can cross the new hole in the dura

Inadequate subarachnoid block from over cautious under-dosing of subarachnoid LA without means of supplementation, making a GA unavoidable.

An alternate technique is to site a CSE thus enabling the anaesthetist to increase the block height if the initial spinal dose is not sufficient.

3.10 Continuous Spinal Anaesthesia (CSA)

CSA can provide excellent intra operative analgesia for caesarean section and the ability to top up the block without relying on a previously untested epidural catheter. The block can be established with small incremental doses of local anaesthetic providing good cardiovascular stability.

A CSA technique may be appropriate for caesarean section in some situations. e.g:-

Morbid obesity

Multiple previous C/S / previous lengthy C/S

Spinal abnormalities/surgery particularly if the epidural space is likely to be abnormal

Cardiovascular or respiratory compromise

CSA may also be appropriate to provide analgesia in labour if epidural analgesia is unsuccessful or not practical

CSA SHOULD ONLY BE PERFORMED BY THOSE WHO HAVE RECEIVED APPROPRIATE TRAINING OR UNDER DIRECT CONSULTANT SUPERVISION

If you feel CSA is an appropriate technique for a patient please discuss it with a consultant.

Consent

Consent should be along the lines of single shot spinal or CSE for caesarean section. The patient should be warned of the risk of PDPH. Experience in the region suggests that this is much less common than the rate quoted in the literature- <5% in obstetric patients. (>200 CSAs have been used in the region in a mixed age group with no PDPH)

Historically there were concerns about the association with cauda equina syndrome. This does not appear to be a problem provided isobaric solutions are used for injection via the catheter and <4cm of catheter left in the space.

Insertion of catheter

Asepsis, level of insertion, local anaesthetic as for single shot spinal

Draw up all intrathecal drugs with a filter needle

Make a nick in the skin at the site of insertion using the blade provided

Insert the 21G (Pajunk) needle into CSF in the usual way. There is no introducer. The 'feel' is somewhere between a spinal and an epidural

Give 1-1.5ml hyperbaric bupivacaine 0.5%

Note the depth at which CSF is encountered (the needle is 9cm long with 1cm markings)

Thread the 25g catheter so that 3-4cm remains in the subarachnoid space

Carefully remove the needle over the catheter. When the needle is removed, the guidewire will automatically be removed from the catheter. DO NOT REMOVE THE GUIDEWIRE UNTIL THE NEEDLE HAS BEEN REMOVED.

Ask the patient to sit up straight to tape the catheter to the back ensuring that there are no kinks. Attach the filter provided.

The catheter should be clearly labelled as intrathecal

Give further isobaric bupivacaine 0.5% in 0.5-1.0ml increments to establish a satisfactory block using a 1ml syringe.

Top ups can be given as required during surgery. Experience suggests doses of approximately 0.5ml every 30 minutes are appropriate.

Unless removal is considered unsafe because of coagulopathy, the catheter should be removed at the end of the procedure. The patient should be positioned as she was for insertion and the catheter removed by gentle traction by someone familiar with spinal catheters who must check that it is

intact. If the catheter is left in situ it should be clearly labelled and not used by anyone other than a suitably trained anaesthetist.

Tips

The catheter is extremely fine and easily kinked. It is strongly recommended that you ensure that it is possible to inject through the catheter before starting surgery. Sometimes it is necessary to re-tape catheters

The volume of the catheter plus filter is 0.8ml. This should be taken into account when giving top ups. Either leave bupivacaine in the filter and take it into account with the next top up, or flush each top up with NaCl 0.9% 1ml.

If you use CSA please give details of the patient to Dr Sarah Hughes for audit purposes.

3.11 Problems that may arise intraoperatively

Hypotension

Causes – Peripheral vasodilatation, fall in SVR following lumbar sympathectomy
Reduced contractility and heart rate from high thoracic block of cardiac sympathetics

Management – Increase i.v. fluid
Ephedrine/ phenylehrine boluses or infusion
Reassurance

A well established method for delivering an infusion is as follows:
A 20ml syringe of phenylephrine (100mcg/ml) is placed in a syringe driver, and connected to patient cannula. Infusion is started once spinal anaesthetic in place (preferably by assistant) at a rate of 50mcg/ml (30ml/hr) and increased or decreased by a factor of 10ml/hr based on blood pressure measurements at 1min intervals. A maximum rate of 60ml/hr (100mcg/ml) is allowed, aiming to maintain normotension. The infusion is typically discontinued at delivery.

Non regional causes

Aorto-caval compression - check table tilt
Haemorrhage - may be concealed
Anaphylaxis
Amniotic fluid embolus

Pain

Causes - Breakthrough - Pain perceived despite bilateral sensory block – especially epidurals. Occurs with high intensity stimuli

Unblocked nerves - Remember the block must extend from at least T4 to S4 to light touch. A block to T1 may be necessary to block peritoneal stimulation in some patients.

Referred pain - Sub-diaphragmatic blood or amniotic fluid produces shoulder pain in up to 6% of patients. Because of the sensory innervation of the diaphragm, it is not safe to block that high.
0-15 degree head up tilt may reduce sub-diaphragmatic pooling of irritating fluids

Inadequate / uneven block - More likely with an epidural – misplaced catheter, trabeculations within the epidural space, posterior longitudinal ligament, etc.

If no improvement with further top-up doses, replace the catheter.

Unrecognised sensory block regression - Beware the failing block towards the end of a prolonged procedure.

Management

PREVENTION!! And reassurance. If the patient detects lack of confidence in the anaesthetist, she will be more prone to interpret any sensation as painful.

Ask the surgeon to stop the operation, if feasible whilst initial assessment made and appropriate treatment commenced (see below)

If delivered and with mother, leave the baby where it is!

Documentation of block height and measures offered and utilised essential

Treatment:

Injection of additional local anaesthetic down epidural if present (check upper level of block first)

Nitrous oxide and oxygen – entonox

Intravenous or epidural opiate

Intravenous fentanyl 25mcg or alfentanil 250mcg boluses. This should not affect maternal respiratory function or neurobehaviour in the newborn

Epidural opiate is unlikely to act rapidly enough, but will enhance analgesic efficacy

Do not administer benzodiazepines

If all these measures fail, and having discussed with the patient, whilst pre-oxygenating and ushering the partner out of theatre, prepare to administer a general anaesthetic.

Dyspnoea

Subjective dyspnoea may develop if the level of block is above T2 – about 5% of cases.

Aetiology probably lack of proprioceptive input from intercostals and chest wall. Reassurance is the most appropriate treatment.

Shivering

Incidence about 30%

Probably normal thermoregulatory response to cooling

Redistribution from core to periphery

Heat loss (after 1 hour)

If persistent, use warm air heating blanket

Nausea and vomiting

Most common cause is cerebral hypoperfusion secondary to hypotension – usually the first symptom

Also Peritoneal manipulation
Anxiety
Opioids

Management

Prevention of hypotension and abrupt treatment if it occurs

Pre-treatment with metoclopramide 10mg

Intravenous ondansetron

Itching

Itching can result from the administration of opioids by any route but is much more common following intrathecal and epidural opiates than with those administered systemically. If a woman complains of previous severe itching it would be prudent to omit opioids or to administer them at the end of the procedure via the epidural catheter so as not to subject a woman to troublesome itching during surgery. There is some evidence that diamorphine may cause more severe itching of longer duration compared to fentanyl.

No treatment is necessary unless the mother is distressed. Simple antihistamines may be effective (e.g.chlorpheniramine). Naloxone is an effective treatment but reduces the duration of analgesia obtained with neuraxial opioids. 100mcg subcutaneously is often sufficient to alleviate symptoms sufficiently without having major effects on the duration of analgesia. Ondansetron may also work - anecdotal evidence

General Anaesthesia for Caesarean Section

3.12 Advantages and Disadvantages

Advantages	Disadvantages
Rapid onset	Potential for maternal aspiration
Reliable	Possible airway management difficulty
Controllable	Neonatal depression
Potential awareness	

Indications

Immediate need for C/S, no epidural in situ

Contraindication to regional technique

Maternal refusal of regional technique

Maternal hypovolaemia

Failure to establish adequate block

Inadequate block during caesarean section

Contraindications

No absolute contraindications, but risk/benefit more strongly in favour of regional anaesthesia if airway difficulty anticipated or other risk relating to GA.

3.13 Procedure

Pre op

Appropriate anaesthetic assessment, paying particular attention to the airway

Explanation of technique

Antacid prophylaxis- ranitidine, sodium citrate

Ensure adequate uterine displacement

Trained assistance

Full monitoring must be instigated with the capnograph connected

Suction must be switched on and to hand

Intubation trolley/difficult intubation box must be checked

Induction

Should be performed in theatre with surgeon present and scrubbed.

Pre-oxygenation 3 minutes, 100% oxygen with close fitting mask and high flow

A rapid sequence with cricoid pressure must be performed

Thiopentone 5-7mg/kg, Suxamethonium 1-1.5mg/kg

(Consider using fentanyl/alfentanil if PET, the paediatrician must be informed)

An endotracheal tube size 7.5 or 8.0mm (be prepared for smaller if PET)

The capnograph trace must be checked before securing the tube

Maintenance

Pre delivery

O_2 50%, Nitrous oxide 50%, isoflurane 2%, 1% after 2 mins

FGF 8-10 l/min, maintain end tidal CO2 4-4.5 kPa

Non depolarising muscle relaxant – relatively small doses needed (care with $MgSO_4$)

After delivery Syntocinon 5iu iv slowly

O_2 30% SpO_2 permitting

I.V. morphine or diamorphine should be given

The operating table should be straightened

Antibiotic prophylaxis should be given

Extubation should be performed awake and in the lateral position or with the patient on her back but sat up.

3.14 Failed Intubation

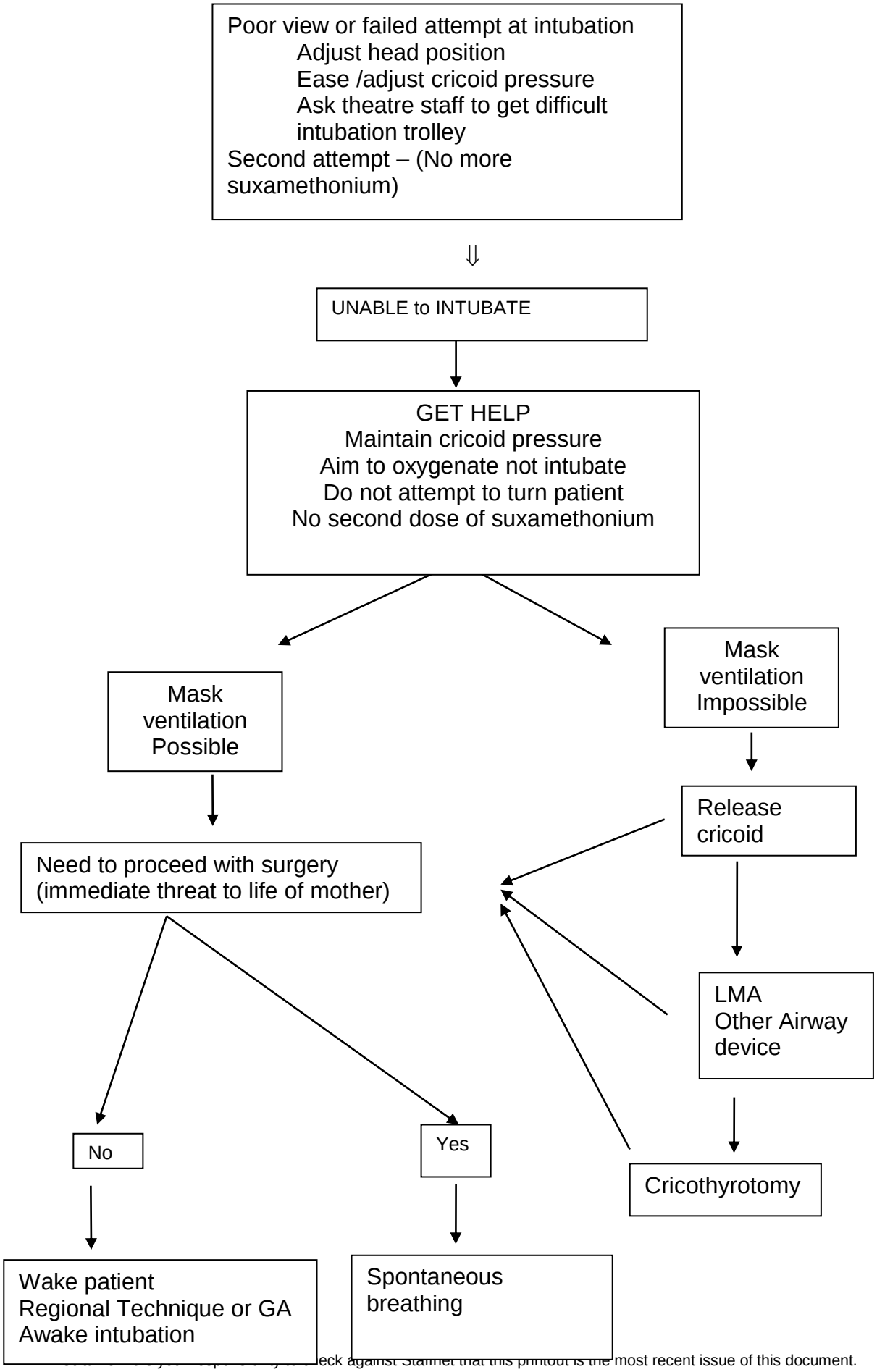
See also Failed Intubation: Guideline

Pre operative assessment vital

If anticipate difficulties avoid GA if possible.

FAILED INTUBATION FLOWCHART:

MATERNAL WELFARE IS PARAMOUNT AND TAKES PRIORITY OVER FETAL CONSIDERATIONS



3.15 Monitoring after Caesarean Section

See also: Post Operative Care: Guidelines

Elective caesarean section under regional anaesthesia:-
Patients return directly to delivery suite recovery room from the operating theatre.
Monitoring should follow the guidelines used in recovery.

Emergency caesarean section under regional anaesthesia:-
Patients go to the delivery suite room from theatre after an appropriate time in recovery.

Caesarean section under general anaesthesia:-
Patients go to theatre recovery until fully conscious and then go to a delivery suite room.

Discharge from theatre recovery is at the discretion of the recovery nurse looking after the patient and should follow the guidelines for the discharge of any patient from recovery.

While a postnatal patient is in recovery, the midwife should remain in recovery. Care of the baby is the responsibility of the midwife, not the recovery nurse.

3.16 Analgesia after Caesarean Section or Instrumental Delivery

A patient information sheet explaining how analgesia will be managed after caesarean section or instrumental delivery is available on the day unit or in recovery. This should be given to all patients pre-operatively for elective patients, in recovery for emergency patients.
Please record all analgesics, anti-emetics and antibiotics given in theatre on the anaesthetic chart and also in the ward prescription chart.

Epidural

Epidural infusion of bupivacaine 0.1% + Fentanyl 2mcg/ml.

May be appropriate for patients who remain on delivery suite after caesarean section (e.g. severe PET with epidural in situ)

Opiates

I.V. in recovery as needed after GA caesarean section

PCA if necessary and patient remaining on delivery suite

Morphine 10mg im 2hrly or 30mg Oramorph oral 2hrly PRN on postnatal wards

NSAIDS

Diclofenac 100mg PR in theatre, 100mg PR 12 hours later

then:- 50mg tds orally after caesarean section or instrumental delivery/perineal repair

Paracetamol 1g qds after caesarean section or instrumental delivery

Contraindications to Diclofenac (NSAIDs)

Pre eclampsia

Significant haemorrhage (review, may be appropriate once stable)

Renal impairment

Thrombocytopenia

Asthmatics sensitive to NSAIDS

If NSAIDS are contraindicated codydramol should be prescribed two tablets qds

3.17 Antibiotic Prophylaxis

Augmentin (Coamoxiclav) 1.2 mg after delivery of the baby at caesarean section.

If minor adverse reaction to penicillin, use cefuroxime 1.5g with caution

If history of anaphylaxis / swelling use clindamycin 600mg – this should be given in 100mls Saline over at least 20 minutes.

3.18 Use of Oxytocin

Oxytocin (syntocinon) is used at caesarean section after delivery of the baby to aid uterine contraction and prevent bleeding. It has however significant cardiovascular side effects (vasodilatation, tachycardia) and should be given slowly and carefully.

Oxytocin **5** iu should be given **slowly** iv after delivery of the baby.

(In the presence of maternal cardiac disease discuss the use of oxytocin with a consultant)

If necessary the 5 iu dose can be repeated.

Oxytocin **50** iu in 0.9% Sal 500 ml should be available and given after caesarean section to all emergency sections and to women at risk of post partum haemorrhage (prolonged labour, oxytocics used in labour, polyhydramnios etc). It is given via a pump at 50ml/hr. If patients need fluid restriction it may be given by syringe pump in a 50 ml volume.

Misoprostol 400 mcg is given routinely PR at the end of surgery or up to 800mcg at request.

3.19 Thromboprophylaxis

Thromboembolic disease remains the leading cause of maternal death.
The risk of thromboembolism should be assessed for all patients and the need for thromboprophylaxis considered.
After caesarean section the risk assessment form for thromboembolism should be completed with the surgical notes.
Low molecular weight heparin should not be given for at least 4 hours following insertion or removal of a spinal or epidural. (see separate section of guidelines for regional anaesthesia and LMWH)
Unfractionated heparin can be considered in patients with marked renal impairment

All patients should wear TED stockings after caesarean section.
Heparin (LMWH) should be considered for patients at higher risk.
Risk assessment should be carried out in theatre as **part of safer surgery checklist** and **prescribed according to current UHS obstetric guidelines**.

Royal College of Obstetricians and Gynaecologists Green top Nov 2009

Any previous VTE+	**High Risk**
anyone requiring antenatal LMWH	e.g. 6 wks postnatal prophylactic LMWH
Caesarean in labour	**Intermediate risk**
Asymptomatic thrombophilia (inherited or acquired)	(e.g. 7d postnatal prophylactic LMWH)
BMI > 40	
Prolonged hospital admission	
Medical comorbidities	
(e.g. heart/ lung disease, SLE,	
cancer, inflamm conditions,	
nephrotic syndrome,	
sickle cell disease, IV drug user)	
Age >35	2 or more = intermediate risk as above
BMI >30	> 3 = TED stockings + LMWH

Parity >2
Smoker
Elective CS
Any surgery in puerperium
Gross varicose vs
Current systemic infection
Immobility (e.g.paraplegia, SPD,
long distance travel (>4hrs))
Pre-eclampsia
Mid-cavity rotational delivery
Labour >24hrs
PPH > 1000ml or blood Tx

<2 = Low risk
mobilise and avoid dehydration

green top guidelines suggest prophylactic enoxaparin dose is weight dependent
(<50kg = 20mg od) (50-90kg = 40mg od) (91-130kg = 60mg od) (131-170kg = 80mg od)
(>170kg = 0.6mg/kg od) but please refer to current UHS obstetric guidelines

4. Management of specific issues

4.1 External Cephalic Version (ECV)

Breech presentation occurs in 3-4% of pregnancies at term.
Following the publication of the Term Breech Trial (Lancet 2000:1375-1383) the Royal College of Obstetricians and Gynaecologists has recommended that all women with an uncomplicated breech (no placenta praevia, uterine/fetal abnormality) at term should be offered external cephalic version.

Serious complications such as placental abruption are rare.
Other complications include fetal bradycardia, cord entanglement and premature rupture of membranes.
External version is said to be associated with an approximate 1% risk of requiring immediate caesarean section.

In this unit patients for external cephalic version are admitted at 1pm for the procedure to be carried out at an appropriate time during the afternoon.
Patients should have breakfast before 8am.
They may drink water until 12:00.
Ranitidine 150mg p.o. should be given on admission.
Venous access (16 or 14G) should be obtained and blood taken for FBC and G&S.

The patient should be seen by an anaesthetist for pre-operative assessment of any potential anaesthetic problems. (Discuss with senior anaesthetist and obstetrician if concerned) Subcutaneous terbutaline 0.25 mg is often given prior to ECV on the request of the obstetrician (this may also be requested if contractions are hypertonic with resulting fetal distress and at LSCS if delivery difficult).

The procedure may take place on labour ward or in theatre according to the wishes of the Obstetrician. If the procedure is performed on labour ward, the obstetric theatre should be immediately available (no patients on delivery suite likely to need to go to theatre)
An Anaesthetist and ODA should be aware that the procedure is taking place and be immediately available (but not necessarily in the room) to provide general anaesthesia if necessary.

4.2 Intra Uterine Fetal Procedures

Fetal blood transfusion, insertion of chest drains etc.
Anaesthetic considerations for such procedures are as for external cephalic version.
The above guidelines should be followed.
A premed of Lorazepam 2mg and morphine 10 mg is given by the obstetricians if over 24 weeks. Iv fentanyl may be requested in addition. After inserting the i.v. cannula the anaesthetist should ideally remain in theatre.

4.3 Placenta praevia – see also Management of Antepartum Haemorrhage guideline

The placenta usually implants in the fundus of the uterus. It is defined as low lying when it encroaches on the lower segment or praevia when it partially or fully covers the internal os. The incidence of praevia is about 0.5% at term and occurs more commonly in mothers who have previously delivered by caesarean section. A 4 point grading system is commonly used

Grade 1 the placenta is low lying
Grade 2 the placenta reaches the os
Grade 3 it asymmetrically covers the os
Grade 4 it symmetrically covers the os.

Anterior or posterior placement should also be noted.

Presentation

Usually presents as painless bleeding in later pregnancy. If there is recurrent bleeding the mother is usually kept in hospital with cross-matched blood readily available.

Diagnosis

Ultrasound scan should be performed urgently to determine the position of the placenta.

Management

Caesarean section is the usual mode of delivery. Minor bleeds are managed conservatively where possible to prolong the gestation whereas active bleeding is an indication for urgent section – haemorrhage can be torrential.

Resuscitation follows basic principals of inserting **two** 14G cannulas, i.v. fluids and emergency cross matching blood. Occasionally it may be necessary for the surgeon to divide an **anterior placenta praevia** in order to gain access to the fetus and this is accompanied by very heavy blood loss.

When an **anterior placenta praevia presents in a mother with a previous uterine scar the possibility of placenta accreta should be considered** – the placenta being firmly implanted into the previous scar. Torrential bleeding can occur on attempting to remove the placenta and hysterectomy is often required.

The risk of placenta praevia with accreta increases with the number of previous caesarean deliveries – from 9% for placenta praevia but no previous section, 30% with one previous section and 50% with 2 –3 previous sections.

Placenta **increta**, where the placenta invades the myometrium, and **percreta** where the placenta fully penetrates the uterine wall are rarer and even more serious.

The mode of anaesthesia for caesarean section depends upon many factors. A senior anaesthetist must be present. A regional technique may be appropriate for a posterior placenta with no active bleeding and no previous sections but this must first be discussed with the obstetrician performing surgery. **An anterior placenta especially in cases of previous section or active bleeding should have a general anaesthetic**.

For cases of specific concern (either prior to a planned section or bleeding in an emergency) consideration should be made to involving interventional radiology. Nigel Hacking/ Tim Bryant can be contacted via the hospital switchboard.

4.4 Cord prolapse

See also: Prolapse of Umbilical Cord: Guideline

Cord prolapse occurs when the umbilical cord prolapses out of the uterus ahead of the presenting part, often before the cervix is fully dilated. It is generally more common when the fetus does not fully occlude the cervix and may follow artificial rupture of the membranes with a high presenting part. It is more common in breech and especially footling presentations.

This is a true obstetric emergency as otherwise the cord is compressed by the presenting fetal part effectively cutting off the blood supply.

Management

Initial management is aimed at trying to relieve the occlusion of the cord by manually lifting the presenting part. This can be aided by steep head-down tilt until delivery. Alternatively a urinary catheter can be inserted and the bladder distended.

Unless vaginal (/assisted) birth is imminent (<10minutes) the patient must be rapidly transferred to theatre for emergency caesarean section which usually is under general anaesthesia unless this poses a serious risk to the mother. Before starting GA check still need Cat 1 LSCS with obstetrician (e.g. check fetal heart i.e. still viable) This is generally a fraught period but care must be taken to ensure routine antacid prophylaxis and ensure appropriate brief anaesthetic and airway assessment before full pre-oxygenation.

4.5 Vaginal Breech Delivery

Most women with a breech presentation, which persists despite attempted external cephalic version, will be delivered by elective caesarean section.

Occasionally women will elect for vaginal breech delivery.

Epidural anaesthesia is helpful, as it will prevent urges to push before full dilatation and will enable controlled manipulation, extensive episiotomy and the application of forceps to the after-coming head. It can also be topped up urgently should caesarean section be necessary.

The second stage should take place in theatre with an anaesthetist immediately available.

4.6 Vaginal Delivery of Twins

The incidence of twins is approximately 1:80 pregnancies.

Problems and special considerations:-

Aorto-caval compression is more severe

- it may sometimes only be relieved in the full lateral position.

Respiratory compromise is more severe.

Pregnancy induced hypertension/PET is more common.
Intrauterine growth restriction is more common and may necessitate induction of labour/caesarean section.
Premature and prolonged labour is more likely.
Malpresentation of the second twin may occur after delivery of the first.
Increased risk of post-partum haemorrhage (uterine atony, large placental site).

Management

Venous access should be established in all women labouring with twins (FBC & Group & Save sent)
Ranitidine 150mg PO should be given every 6 hours.
Women are generally recommended to have an epidural analgesia in labour. During the second stage of labour there is a high risk of (occasionally urgent) intervention.
Risk of vaginal birth followed by caesarean for the second twin is approx 3-5%
Risk of caesarean delivery for both twins approx 30-40%.
A topped up effective epidural in the second stage reduces the risk of general anaesthesia if operative delivery is required. The disadvantage is reduction in effective maternal effort, which in itself increases the risk of assisted delivery.
The risks and benefits must be discussed and a plan agreed with the mother/parents, obstetrician & midwife and clearly documented.
The on-call anaesthetist should be part of this discussion and fully aware of the agreed plan for delivery. This discussion should replace a default 'automatic-top-up' the epidural.

It is recommended delivery takes place in theatre. If an uncomplicated pregnancy with both twins cephalic presentation there may be the option of birth on labour ward with plan for urgent transfer if required.
Women with epidurals and or reduced mobility should be on a hover mattress.
Syntocinon 10 units IM after 2nd twin and misoprostol may be sufficient but be prepared to give usual syntocinon infusion and be vigilant for significant post partum haemorrhage.

4.7 Anaesthesia for Manual Removal of Placenta

Failure to deliver the placenta is a cause of post partum haemorrhage. Unless there is rapid success after conservative measures, surgical removal is necessary. Prophylatic antibiotics (same as for LSCS) should be routinely given.
Intravenous access should be established as early as possible and blood loss replaced.

Conservative measures (mother will often have)

Oxytocin infusion

Encouraged to Breast-feeding the baby

Emptied bladder

Regional Anaesthesia

Whenever possible

Block to T6-8 is necessary to allow manipulation of the uterine fundus

If present top up via an existing epidural catheter with bupivacaine 0.5%

Spinal anaesthetic if no epidural catheter- 2ml heavy bupivacaine 0.5% should provide an adequate block.

(post-natal patients may be too uncomfortable to sit up for the siting of a spinal!)

General Anaesthesia

May be necessary if regional anaesthesia is contra indicated or if there is ongoing bleeding and hypovolaemia

Patients should be assumed to have a full stomach. Antacid prophylaxis should be given and a rapid sequence induction performed.

4.8 Analgesia and Anaesthesia for women with a high BMI.

See also BMI: Optimal weight for pregnancy & childbirth - Guidelines for women with BMI >30

All women should be weighed after 36 weeks and an accurate weight in Kg recorded in the notes. If this hasn't been done, the woman should be weighed on the day unit scales ASAP.

Women with a BMI greater than **45** at booking should be seen at the MAPP clinic.

All women >115Kg in labour should be on a hover mat in case of urgent need to go to theatre and be given ranitidine 6 to 8 hourly.

Such women should have an early discussion about the risks and benefits of epidurals and in particular about the increased risks with GA (particularly if they have not been seen in the MAPP clinic). They should be warned that there are increased risks associated with siting the epidural, including failure and an increased dural puncture rate. A senior anaesthetist should usually be involved. 5cm of catheter should be left in the epidural space. The epidural must be closely monitored and replaced if not working fully. Many problems in the management of women with high BMI are related to difficulty in establishing venous access, regional techniques and difficulty in monitoring. Have a low threshold for inserting arterial lines to monitor BP if NIBP is difficult to establish. A history of OSA is a predictor of difficult intubation and should be asked about.

If a caesarean section is necessary blood crossmatch should be considered and two large i.v. cannulas inserted. Careful attention should be paid to positioning the mother in theatre.

All women with a BMI >35 should be notified to the anaesthetist for review when they are on the labour ward. This could involve brief review to more formal discussion as appropriate and should be documented in the notes.

5. HDU organisation

See also: High Dependency Unit: Guidelines

5.1 Critical illness

Occurrence of critical illness in pregnancy is low < 5% (ITU 1%)
1 in 10,000 mortality (direct and indirect)
Causes:

Thrombo-embolism, Pre-eclampsia, Amniotic fluid embolism, Sepsis,
Haemorrhage and Cardiac disease (indirect)

Labour Ward Guidelines are available and should always be used. They have been agreed across the multidisciplinary team and should facilitate a team approach.
One hard copy is available on the labour ward – this should be the latest version and should agree with the version on hospital intranet. They include haemorrhage, PET/ Eclampsia, Thrombo-embolism, Diabetes etc…

Early recognition and identification of risk factors is important (e.g. chest pain and PE, placenta praevia and previous LSCS). Some differential diagnoses are given later. Sub-standard care is identified in most of the deaths reported in the Confidential Enquiry.

Early referral to seniors / specialists and their attendance has been highlighted as being important, and this includes early liaison with intensive care.

5.2 The HDU

Designated two-bedded unit on the Labour Ward, Level D Princess Anne Hospital.
Ideally HDU facilities are available 24 hours a day, seven days a week.
There should be at least one midwife per two patients and there should be an HDU trained midwife available on every shift.
The duty Obstetric SHO will ensure continuous medical cover to the HDU.

Overall responsibility for a patient on HDU remains with the admitting Consultant Obstetrician but the duty team will manage the patient on a daily basis.

The Anaesthetist's role on HDU is part of the team ensuring that the guidelines are effectively implemented, using their anaesthetic and critical care skills / knowledge.

Women on HDU should have medical (anaesthetic, obstetric and midwife) review at least 12 hourly documented in the notes (including where applicable that the anaesthetist is present). An agreed plan should be documented in the notes. Clear explanation should be given if there is deviation from the current guidelines. Review should include discussion with the patient/family.

5.3 HDU Admission criteria

Women requiring support for a **single** failing organ system, excluding respiratory support.
Women who benefit from more detailed observation or monitoring than can be provided on the general ward
Women no longer needing intensive care but not yet well enough for the general ward
Post-operative patients who need close monitoring for longer than a few hours.

Patients likely to require advanced respiratory support, or support for two or more organ systems should be referred for Intensive Care assessment at the earliest opportunity.
The duty Consultants in Obstetrics and Anaesthesia must be informed about potential patient transfers to Intensive Care.

Discharge criteria

Discharge of a patient from HDU will be at the discretion of the duty Consultant Obstetrician/ team.
In general the patient will no longer satisfy any of the admission criteria or require admission to ITU

6. Possible differential diagnoses

SEEK HELP EARLY

6.1 Neurology

Transient sensory symptoms seen in 1 in 300, especially if cephalo-pelvic disproportion. More common in short, primigravida, large baby, prolonged labour, forceps delivery.

Non-anaesthetic

Compressive

Lumbo-sacral (L4,5)	unilateral foot drop, weak ankle dorsiflexion and eversion sensory deficit lateral leg, dorsum foot similar to common peroneal nerve palsy
Femoral (L2,3,4)	weak quads (difficulty climbing stairs), absent patella reflex, loss of sensation front of thigh
Obturator (L2,3,4)	weak hip adduction, sensory loss inner thigh
Lat.Cut Thigh (L2,3)	sensory only painful paraesthesia upper outer thigh– meralgia paraesthetica

Nerve root lesion due to acute disc prolapse (more common in pregnancy 80% at L4/5 or L5/S1)

Co-existant neurologye.g. M.S. may relapse in pregnancy (lower rate in 3rd trimester but increased in the first 3 months postnatal c.f. non-pregnant)

Myasthenia gravis (~ $^1/_3$ get better/ get worse / stay the same) NB risk to neonate

Anaesthetic

Prolonged neurological deficit occurs in < 1 in 10,000

Rare, these need expert opinion/ follow up

Cauda equina syndrome

low back pain, saddle anaesthesia, chronic paraplegia, sphincter dysfunction.

Similar to arachnoiditis but earlier presentation

may be permanent neurological damage

associated with spinal micro-catheters

Neurotoxicity / arachnoiditis(progressive)

difficulty walking, sphincter dysfunction, meningeal irritation

similar symptoms to cauda equina syndrome but often later presentation

May occur months after insult. May be permanent neurological damage.

assoc with hyperbaric 5% lidocaine, contaminants (skin prep/ preservatives)

Progressive fibrosis may cause spinal canal narrowing visible on Xray

Ischaemia

Possible causes: prolonged hypotension, adrenaline-containing solutions
large epidural volume with spinal stenosis, anomalous cord blood supply?

Anterior spinal artery syndrome
para / quadraplegia, loss to pain & temperature
incontinent to urine & faeces but intact proprioception, light touch, vibration

Meningitis more common with spinal c.f. epidural,
50% caused by streptococcus
fever, rigors, photophobia, vomiting, neck stiffness

Nerve root lesion
Needle injury check for pain/ paraesthesia on insertion
e.g. epidural needle off midline, conus injury from spinal needle

Haematoma back pain, bladder dysfunction, motor and/or sensory loss
need MRI and surgery within 8 hours for good outcome

Cranial subdural haematoma persistent (usually late) headache,
visual disturbance, N & V

Epidural abscess especially with prolonged epidural use,
50% staphyloccocus
backache, root pain, weakness / paralysis, neck stiffness, headache
Increased WCC, ESR, Temp (blood culture +ve in only 25%)
need gadolinium enhanced MRI

Peripheral nerve injury e.g. common peroneal nerve injury from lithotomy poles

Management of suspected neurological injury

Obtain full history from notes, anaesthetic chart, epidural form and patient with particular interest re exact onset time, location, radiation of symptoms and pain during needle insertion and local anaesthetic injection. The obstetric history is very important especially the following factors: abnormal presentation, weight of the baby, leg position during second stage of labour, duration of second stage and instrumental delivery.

Be suspicious of:

Prolonged motor block >8 hours since last epidural top-up/spinal
Severe back pain
Progressive or proximal lesion
Sphincter dysfunction
Bilateral leg weakness
History of pyrexia

Thorough neurological examination:

Examine the back and look for :-

- Puncture sites and signs of inflammation
- Palpate to elicit any tenderness particularly if you get radicular pain on palpation of back
- Tenderness on deep palpation of spinous process (transmits pressure to epidural space, suggestive of intraspinal mass lesion),
- Sacro iliac joint tenderness

Document sensory loss to touch/ pin prick/ cold (draw diagram)
Tone and Motor function of hip, knee, ankle
Reflexes patella, ankle and plantar
Gait, ability to get out of bed/climb stairs
Examine anal tone if any history of sphincter dysfunction
Raised white cell count

If you cannot exclude a **space occupying lesion** i.e. epidural haematoma/abscess request urgent neurosurgical opinion and arrange urgent MRI scan and inform consultant anaesthetist. **Epidural haematoma/abscess needs to be operated on within 8 hours of onset of paraplegia for recovery to occur.**

If you suspect **meningitis** start iv antibiotics in conjunction with neurological opinion. Depending on clinical state of patient may be indication for CT prior to lumbar puncture.

If prolonged deficit that does not fit picture of obstetric palsy – obtain expert neurology opinion

If appears to be neuropathy due to anaesthetic trauma

- try to reassure and ensure clear documentation

- obtain photocopies of all records
- inform anaesthetic consultant and anaesthetist involved
- arrange follow-up at the MAPP clinic in 6 weeks
- obtain neurological opinion and nerve conduction studies as soon as possible
- consider referral to chronic pain consultant if pain at 6 week follow-up

Most neuropathy cases will be obstetric related and if this is suspected through history and examination, these patients need to be handed back to the admitting obstetric team for short and long term follow-up. This needs to be clearly documented in the notes

6.2 Breathlessness

Anaemia lower limit normal in pregnancy Hb > 10.5g/dl

Anxiety hyperventilation, paraesthesiae, no hypoxia on ABG

Asthma asthma may get better, worse or stay the same in pregnancy
Importance of maintaining regular therapy
Watch PEFR diurnal variation, morning dipping and reduced response to bronchodilators

Pulmonary Embolus pleuritic / central chest pain, ST, haemoptysis, suspicion if risk factors. ECG (right heart strain), CXR (oligaemia, infarct, effusion), ABGs ($\downarrow pO_2, \downarrow pCO_2$).confirm with V/Q scan (difficult if pneumonia)
Heparinise until excluded
Risk factors include: >80kg, >35yrs, para≥4, operative delivery (esp emerg), Thrombophilia, Previous venous thromboembolism, immobility/bed rest, PET, varicose veins, pelvic v trauma, dehydration

Pulmonary Oedema volume overload (eg in pre-eclampsia), valvular disease
Orthopnoea, PND, haemoptysis, ST,
mid-diastolic murmur
ECG, CXR, EchoCG

Peripartum Cardiomyopathy
Constrictive - HOCM – 70% familial
Dilational – 36 weeks → first 5 months postpartum
ECG, CXR, EchoCG

Pneumonia	productive cough, fever
(consider atypical / viral pneumonia e.g.VZV, AFB)	
	CXR, FBC, Sputum, blood cultures, serology
Pneumothoraxpleuritic pain, surgical emphysema,	
? excessive valsalva with pushing	
	CXR unless tension pneumothorax suspected
Physiological – pregnancy	After exclusion of other causes above

6.3 Chest Pain

Aortic dissection	often severe, radiates to back 'tearing' symptoms from area blocked e.g. carotid, coronary, iliac, differential arm BP CXR, EchoCG (neither can exclude though) CT / MRI (if still high suspicion after CXR & Echo then CT is justifiable from exposure risk)
Cardiac	angina, precipitated by exercise, common in smokers ECG, CXR , troponin levels
Gastro-oesophageal reflux	positional (recumbent /leaning forward), related to eating sharp/ burning, retrosternal responds to antacids
Musculo-skeletal	related to arm & chest movement, localised tenderness
Pneumonia /pleuritic	see 'breathlessness'
Pneumothorax	see 'breathlessness'
Pulmonary Embolus	see 'breathlessness'

6.4 Collapse

Amniotic Fluid Embolus (A.F.E.)

1 in 30,000 associated with precipitous labour with intact membranes

antenatal complications in 50% (e.g. amniocentesis, placenta praevia, fibroids, polyhydramnios, cervical suture) also with increasing age, hypertonic contractions, induced / augmented labours

Presentation - acute hypotension/ cardiac arrest

-acute hypoxia (dyspnoea/ pulmonary oedema, cyanosis)

- coagulopathy/ D.I.C.

occurrence of above 3 during labour (90%), Caesarean section or within 30 minutes of delivery should think A.F.E. unless other explanation for signs

grand mal seizures occur in 10%

monoclonal Antibody test to Sialyl Tn Glycoprotein (↑10x)

Treatment is supportive

Early senior anaesthetic involvement

Oxygen, fluid and inotropes, fetal delivery A.S.A.P, management of coagulopathies

Cerebral vein thrombosis (CVT)

1 in 10,000, usually postpartum, photophobia, impaired consciousness, raised ICP,

focal signs (in 50% e.g. hemiparesis), fever, leukocytosis, seizures

Treatment - hydration, anticonvulsants, ?anticoagulation

CT / MRI + thrombophilia screen

Convulsions see 'Convulsions'

Haemorrhage

Ruptured ectopic

Non-obstetric causes

Placenta praevia - 0.3-0.6% assoc with APH and PPH presentation painless PV bleed

Placental abruption - 1-2% - tense, irritable uterus, concealed blood loss

Major abruption in 0.2% with perinatal mortality of 50%

IUD probably indicates >1-1.5 litres blood loss and risk of D.I.C. in 30%

Post-Partum Haemorrhage (PPH) i.e. >500ml

>1500ml severe/ major PPH, anaesthetist required

>2000ml senior help must be called

Causes/ risks:

Uterine atony, previous PPH, multiple pregnancy, large baby (>4kg)

Polyhydramnios, long (>12hrs) or v. short labour, prolonged oxytocin use, I.O.L.

Grandmultips (4 prev pregs >24wks), chorioamniotis, retained products

Inverted uterus, ruptured uterus

Follow Labour Ward Guidelines

Pulmonary Embolus see 'Breathlessness'

Sub-arachnoid haemorrhage

1 in 5,000

Usually postpartum. 1:1 AVM to berry aneurysm rupture

sudden onset severe headache (usually occipital)

collapse / L.O.C.vomiting, neck stiffness, papilloedema

Often 'focal' signs

CT / MRI + angiography

Treatment as for non-pregnant

Aim for epidural, short 2nd stage labour (?low instrumental delivery)

Beware increased ICP after recent SAH and risk with regional anaesthesia

6.5 Resuscitation of the collapsed pregnant patient

See also: Collapse of pregnant patients – management of, Guideline

Causes of collapse:

Pulmonary embolism

Amniotic fluid embolism

Haemorrhage (large haemorrhage may be concealed)

Labour management factors e.g. anaesthesia

Severe supine hypotensive syndrome

Other causes not specific for pregnancy

MI

IV local anaesthetics

Eclampsia

Total spinal

Treatment:

Position: Left lateral whenever possible, unless there is a need for external cardiac massage. If CPR is needed, tilt pelvis to left hand side with (resuscitation) wedge or rolled up blanket under right hip and manually displace the uterus to the left (one of the team members is designated to continue displacement during CPR).

Move from Basic Life Support to Advanced Life Support (ERC- European Resuscitation Council Guidelines) ASAP with the use of cricoid pressure until intubated -
NB more rapid hypoxia and increased chance of aspiration pneumonitis in late pregnancy.

Caesarean section or immediate vaginal delivery should be performed if no maternal circulation established after **five minutes** of full Advanced Life Support (and adequate intravenous fluid resuscitation if appropriate), and within 15 minutes in any case in order to improve maternal circulation as uterine displacement does not guarantee full relief of inferior vena cava compression.

After delivery, consider compression of the aorta to increase peripheral resistance and improve coronary and cerebral perfusion:
directly if abdomen open
otherwise external, using fist pressed backwards towards vertebral column in midline just above umbilicus
Should a cardiac arrest occur in a pregnant woman on the antenatal wards, resuscitation and peri-mortem caesarean section (if required) should be carried out on the ward using the equipment provided on the peri-mortem caesarean section trolley. Anaesthetic drugs available include
ketamine and vecuronium.

6.6 Convulsions

Eclampsia The most common cause of seizures
Magnesium Sulphate is given unless eclampsia is excluded with BP, urinalysis, FBC, coag, U+Es, creatinine, uric acid,LFTs. Normal BP alone is not sufficient to rule out eclampsia – give MgSO4

Amniotic Fluid Embolus see ‘Collapse’

Epilepsy
Idiopathic CT / MRI + EEG

Secondary (e.g. surgery, mass, anti-phospholipid syndrome)

Cerebral vein thrombosis (C.V.T.) see 'Collapse'

Thrombotic Thrombocytopenic Purpura (T.T.P)
mostly occurs immediately postnatal
headache, irritability, fever, renal impairment,
decreased conscious level
no coagulopathy
may resemble pre-eclampsia but blood pressure usually normal
FBC + film

Stroke
1 in 20,000 most postpartum (ischaemic or haemorrhagic)
CT / MRI, echoCG, APS screen

Post Dural Puncture see 'Inadvertent Dural Puncture'

Drug or alcohol (intoxication / withdrawal)
Urine + blood toxicology
Including anaesthetic drugs

Metabolic (esp ↓Glc, ↓Ca^{2+}, ↓Na^{+})
Glucose, LFTs, Ca^{2+}, U+Es

Pseudoepilepsy EEG

Posterior reversible encephalopathy syndrome (P.R.E.S.)
altered concious level, headaches, ?visual disturbances
+/- hypertension

Management of suspected eclamptic convulsion

Basic resuscitation with particular regard to airway management /protection.
Remember lateral tilt.

Unless eclampsia is excluded **Magnesium sulphate** is the drug of choice for control of a fit on the labour ward.

Regime:-

4g (40mls of 10% solution) is given over 10–15 minutes iv followed by a maintenance infusion of 20g (40mls of 50%) in 1 litre of normal saline at a rate of 1g per hour (50 ml/hr infusion rate).
Infusion is continued at this rate provided that urine output remains >25 ml/hr, reflexes are not completely abolished and the respiratory rate does not fall below 12 / minute.
This same regime is also used as prophylactic therapy in women with severe pre-eclampsia, particularly with neurological symptoms or signs.

If fits continue a further 2g bolus should be given iv.
Intubation and ventilation should be considered if airway at risk or ongoing fits.

6.7 Headache

Tension Headache relation to stress, migraine features usually absent

Migraine frequency reduced in pregnancy but increased in 1st week post-partum
often throbbing, unilateral, prodromal visual symptoms, N & V, photophobia
no residual physical signs after attack

Pre-eclampsia headache, flashing lights, N & V (+/- raised BP, proteinuria),
FBC, U&E, creatinine, uric acid, coagulation, LFT

Meningitis malaise, fever, rigors, photophobia, vomiting, neck stiffness

Sub-arachnoid haemorrhage see 'Collapse'

Benign intracranial Hypertension
usually retro-orbital headache, associated papilloedema, diplopia, increased ICP
associated with obesity, rapid weight gain
no CT / MRI evidence of hydrocephalus / Space-occupying lesion
Treatment: limit weight gain, monitor visual fields, acuity
Steroids, CSF drainage/ shunt, thiazides

CVT see 'Collapse'

Post sub-arachnoid block postural, frontal / occipital, neck stiffness, tinnitus, visual disturbance
see also inadvertent dural puncture

severe headache in up to 0.75% even with pencil point needle

Space-occupying lesion

6.8 Intrauterine fetal resuscitation

The aim of intra-uterine resuscitation (IUR) is to increase fetal oxygen and reduce acidosis.
It may allow time for the epidural top-up for LSCS to become effective / allow time for spinal – hence avoiding GA.

- Syntocinon off
- Position full left lateral; continue for transfer & on operating table [if FHR remains low try right lateral / knee elbow for possible cord compression]
- Oxygen maximum flow (15 litre/min) via tight fitting Hudson mask with reservoir bag
- Intravenous Hartmann's 1 litre rapid infusion [unless fluid intake restricted e.g. Pre-eclampsia]
- Low blood pressure – consider intravenous ephedrine
- Tocolysis
- Terbutaline 0.25 mg subcutaneous (0.5 ml from a 1ml ampoule).
- Alternatively for immediate action GTN sublingual spray, 2 puffs initially, repeat after 1 minute until contractions stop, maximum 3 doses. Check blood pressure frequently.

Be prepared for increased blood loss from a relaxed uterus – use syntocinon (oxytocin) infusion and /or misoprostol.

N.B. ELECTRONIC FETAL MONITORING SHOULD BE RESTARTED IN THEATRE AND MAINTAINED AS LONG AS POSSIBLE.

References:

The use of electronic fetal monitoring. NICE 2001
Thurlow, Kinsella. Intrauterine resuscitation: active management of fetal distress.
Int J Obstet Anesth 2002;11:105

7. SUB APPENDICES

7.1 (TAP) blocks for postoperative analgesia

Performing transversus abdominis plane (TAP) blocks for postoperative analgesia following caesarean section under general anaesthesia

TAP blocks may be used as part of a multimodal postoperative analgesia regimen for women following caesarean section under general anaesthetic. The aim of a TAP block is to block the sensory afferent nerves supplying the anterior abdominal wall. These nerves pass through the neural plane between the internal oblique and transversus abdominis muscles (1). There are 2 approaches to blocking the nerves in this plane and these are (1) the blind 'double-pop' technique or (2) using ultrasound to locate the fascial planes. TAP blocks have been shown to reduce postoperative opioid requirements and increase patient comfort (2, 3, 4). There is currently an ongoing Cochrane database review of the use of TAP blocks for postoperative analgesia.

Guidelines for performing the block:

1. You must be competent in performing this procedure. If not, then only proceed with supervision.
2. This block is carried out at the end of the caesarean section once the dressing is on and prior to waking up the mother.
3.The block must be carried out as an aseptic procedure.
4. The block needs to be performed bilaterally.
5. Assemble equipment. Recommend using a 5 or 10cm stimuplex needle depending on the size of the woman and the technique used. N.B. If using the 'double-pop' technique the depth is often 3-4cm.
6. Calculate volume and concentration of local anaesthetic based on body weight. Suggest using 20 mls 0.25% bupivacaine each side.
7. Ensure negative aspiration before injecting this large dose of local anaesthetic.
8. Risk of complications is low, but careful placement essential to avoid peritoneal penetration.
9. Intraoperative analgesia requirements are the same and immediate postoperative analgesia requirements are often significant therefore prescribe postoperative analgesia as per usual. The block takes time to establish, however, it has been shown to provide analgesia for up to 36 hrs (3).

References:

1. Transversus Abdominis Plane Block: A Cadaveric and Radiological Evaluation *Regional Anesthesia and Pain Medicine*, Volume 32, Issue 5, Pages 399-404

J. McDonnell, B. O'Donnell, T. Farrell, N. Gough, D. Tuite, C. Power, J. Laffey
2. The analgesia efficacy of transversus abdominins plane block after caesarean delivery: a randomised controlled trial. McDonnell J, Curley G et al Anesth Analg 2008; 106:186-191

3. The analgesia efficacy of transversus abdominis plane block after abdominal surgery: a prospective randomized controlled trial. McDonnell J, O'Donnell B et al Anesth Analg 2007;104:193-197
4. Audit of transversus abdominis plane block for analgesia post caesarean section. Hebbard P, Royse, C. Anaesthesia Volume 63 (12) , p 1382

7.2 Intraoperative cell salvage

It is estimated that severe haemorrhage occurs in 6.7 per 1000[1] deliveries and that obstetric haemorrhage accounts for 3-4% of all red cell transfusions in the UK[2]. Cell salvage is an autologous blood transfusion technique that is well established in vascular, orthopaedic and cardiac surgery. Its use in the obstetric population has been slow due to theoretical risk of amniotic fluid embolism and alloimmunisation. Recently its use in obstetrics has been endorsed by the following bodies:

- Confidential enquiries into maternal and child health (CEMACH) [3]
- OAA/ AAGBI Guidelines[4]
- National Institute of Clinical Excellence (NICE)[5]
- Royal College of Obstetricians and Gynaecologists (RCOG)[6]

This widespread endorsement is a direct result over concerns in availability of stored blood as well as risks associated with transfusion of allogenic blood as highlighted by the Serious Hazards of Transfusion (SHOT) reports[7].

Risks

- Dilutional coagulopathy

As with allogenic blood transfusion, clotting factors and platelets are removed and need to be replaced in cases of major bleeding.

- Amniotic fluid embolism (AFE)

There is only one documented case in the literature of maternal mortality attributed to AFE following autologous transfusion[8]. However this has not been accepted as such due to high co-morbidity from other risk factors and an inconclusive post-mortem examination. Thus this risk remains theoretical only.

- Alloimmunisation

Cell salvage is unable to differentiate between maternal and fetal red blood cells[9] and risks alloimmunisation and consequent risks for future pregnancies. Rhesus negative mothers should be warned of the risk that can be counteracted by anti-D immunoglobulin. These patients may require a higher dose of anti-D as a result of autologous transfusion.

Patient Selection: Use of cell saver is recommended in the following situations:

- Elective Surgery:
  - Placenta Praevia/ Accreta
  - Other risk factors for severe PPH (>1000ml):

- Uterine fibroids
- Previous PPH
- Jehovah's Witness

See also: Women who decline blood transfusion guideline

- Rare red cell antibodies causing cross-matching difficulties

- Emergency Surgery:
- Severe PPH
- Ruptured ectopic pregnancy

Patient information and consent

The NICE guidance states that: *"whenever possible, the woman understands what is involved and the theoretical risks, and agrees to have the procedure".*

For all elective cases either the obstetrician or anaesthetist must discuss the advantages and risks with the patient, formally obtain the patient's consent and document this clearly in the notes/ anaesthetic chart.

Using the Cell Saver in Maternity theatres:

INTRA-OPERATIVELY

- All elective cases should be booked as far in advance as possible with the theatre managers to ensure availability of trained staff able to use the system.

- In emergencies, the ability to offer cell salvage to patients will depend on the availability of trained staff.

- An extra operating department assistant (ODA) or practitioner should be available to solely run the machine. The ODA assisting the anaesthetist should not be distracted from their immediate duties.

- The use of the cell saver must be sanctioned by either an obstetric/ anaesthetic consultant or senior trainee (SpR 4-5/ ST6-7), after discussion with theatre members.

- A separate suction system should be used till after the delivery of the fetus and placenta to reduce the risk of contamination with amniotic fluid. In life threatening haemorrhage a careful clinical decision to use one suction system (salvage red cells from the start of the procedure) can be

made by the managing team, as in-vitro evidence demonstrates that cell salvage systems can remove plasma phase elements of amniotic fluid whatever the initial load[10].

- The use of a **leucocyte depletion filter** to reinfuse processed blood is MANDATORY. Ideally this should be the LeukoGuard RS filter (Pall Biomedical) as it is the only filter proven to effectively eliminate residual elements of amniotic fluid[10]. Occasionally the filter may cause activation of bradykinin within the reinfused blood resulting in marked hypotension.

- Use of cell saver can make estimation of acute blood loss more difficult as whole blood and washed swabs appear in the collecting unit volume. Regular review of processed blood, collecting unit and wash volumes is necessary along with the clinical picture and haemocue as appropriate.

POST-OPERATIVELY

- Kleihauer-Betke testing of all Rhesus negative women is essential to guide dose of anti-D required to prevent alloimmunisation.

- Patients should be monitored closely in the post-operative period.

- Any suspected complications should be reported to the Medicines and Healthcare products Regulatory Agency (MHRA).

Contraindications to use of ICS:

- Perineal or lower genital tract bleeding (risk of infection)

- Sickle cell anaemia and trait, wash procedure may result in sickling of red cells. There have been case reports of its successful use in patients with sickle cell anaemia and other inherited haemoglobinopathies[11-13].

- Presence of other contaminants (bowel contents, urine, tumour cells) or topically applied cleansing or clotting agents in the operative site.

References:

1. Waterstone M, Bewley S, Wolfe C. Incidence and predictors of severe obstetric morbidity: case control study. *BMJ* 2001; **322**:1089-93

2. Catling S. Blood conservation techniques in obstetrics: a UK perspective. *Int J Obstet Anesth* 2007; **16**: 241-9

3. Why Mothers Die. Confidential Enquiry into Maternal and Child Health 2000- 2002. London: RCOG; 2004

4. OAA/ AAGBI Guidelines for Obstetric Anaesthetic Services. Revised edition: OAA/ AAGBI; London May 2005

5. National Institute for Health and Clinical Excellence. Intraoperative blood cell salvage in obstetrics. Interventional Procedure Guidance 144. November 2005

6. Royal College of Obstetricians and Gynaecologists. Blood transfusion in obstetrics. Green top Guideline No. 47; December 2007

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8. Oei SG, Wingen CBM, Kerkkamp HEM. Cell salvage: how safe in obstetrics? *Int J Obstet Anesth* 2000**; 9**: 143

9. Waters JH, Biscotti C, Potter PS etal. Amniotic fluid removal during cell salvage in the caesarean section patient. *Anesthesiology* 2000; **92**: 1519-22

10. Catling SJ, Williams S, Fielding AM. Cell salvage in obstetrics: an evaluation of the ability of cell salvage combined with leucocyte depletion filtration to remove amniotic fluid from the operative blood loss at caesarean section. *Int J Obst Anesth* 1999; **8**: 79-84

11. Fox JS et al. "Autologous blood transfusion and intraoperative cell salvage in a patient with homozygous sickle cell disease" *Cleve Clin J Med* 1994; **61(2):** 137-40

12. Waters JH, Lukauskiene E, Anderson ME. "Intraoperative blood salvage during caesarean delivery in a patient with thalassemia intermedia" *Anaesth Analg* 2003; **97**: 1808-1809

13. Dietrich GV. "Intraoperative blood salvage in special procedures and diseases". *Infusion therapy and transfusion medicine* 2003; **29**: 142-146

Audit

ASPECT OF CARE/OUTCOMES	EXPECTED STANDARD/ TARGET	SOURCE OF DATA COLLECTION
Indication for use of Cell Salvage clearly documented in notes	100%	
Patient discussion and consent in notes	100%	
Adequately trained staff only using the system	100%	
All Rh –ve women tested and receive adequate dose of anti-D	100%	

7.3 Caesarean section in SGH

Patient Details

(e.g. radiology assisted) Anaesthetic checklist
2 ODAs if cell saver
(if Xray suite 1 from PAH, 1 from SGH)

Phone access & useful extension nos
Access to equest / computer

Haematology team aware of case and location for support/ blood products (Transfusion x4620)

Recovery / post op care planned .....
HDU (x8430) / ITU aware

Drugs
Syntocinon (6 amps x 10 iu)
Ergometrine (2 amps x 0.5mg)
Carboprost (8 amps x 0.25mg)
1 for surgeon intra uterine

Suppositories
Diclofenac 100mg (if minimal bld loss)
Paracetamol 1g
Misoprostol 4 x 200mcg

Thiopentone 500mg Propofol 3 x 20mls
Suxamethonium (2 amps)
Vecuronium (1 box)

Atropine 0.6mg
Glycopyrollate 0.6mg
Neostigmine or Neostig/ Glycopyrollate mix

Fentanyl Lidocaine 1% 5ml x 2
Morphine Bupivicaine 30ml x 0.5% plain
Ondansetron 4mg x 2 amps
Cyclizine 50mg

Antibiotics (coamoxiclav 1.2g/
clindamycin 600mg if pen allergic)

Phenylephrine (3 x 1mg in 10ml amps)
Ephedrine (2 x 30mg amps)

Saline 5 x 20ml Water 5 x 20ml

Fluids + giving sets
Gelofusine 4 x 1l
Hartmanns 4 x 1l
Saline 4 x 1l
Saline 4 x 0.5 l

Syringes, labels, drawing up needles, hypodermic needles, tape, iv dressing, alcohol swabs, gauze, cannulas

Equipment
Anaesthetic machine (datex ohmeda S/5 avance + vapourises full, machine checked)
Transfer monitor
Tilting trolley for extubation / transfer
Wedge (Rm7 XR table tilts head down)
Level 1 fluid warmer on 1 14/16G cannula
Bair Ranger / Hotline on 1 14/16G cannula
Arm boards for L&R arms (in XR suite)
+ padding + ties
Bair Hugger + abdo access blanket
Flowtrons

1 iv pump for syntocinon (with giving set)
1 syringe driver (50ml syringe extension set)

Arterial line set up + transducer (will use)
CVP line set up + transducer (may use)
(incl pack, gown, gloves, skin prep)
Temp probe
Urometer
Nerve stimulator

Na Citrate 30ml 0.3M
Usual Selection of ETT 7, 7.5, 8.0,8.5, tape, tie
Laryngoscopes (polio, short handle, ?McCoy)
airways, facemasks, bougies, HMEF, catheter mount, NG tube
Suction + yankauer + suction catheter

Usual resusc drugs with defib (incl Norad, Ca^{2+})

Access to crossmatched blood in fridge
checked location .....
Access to ABG analyser (+ code + vamps)
Access to sonosite (if cvc used)
Haemocue in XR theatre
Blood bottles (FBC, U+Es, Coag, ABG syringe)

Obs HDU/ MEWS chart for recovery

Staffing

Anaesthetist	1	2
ODA	1	2
Midwife		
Recovery Nurse		
Obstetrician	1	2

?Bold items from PAH

7.4 REMIFENTANIL PATIENT CONTROLLED ANALGESIA FOR LABOUR

7.4.1 INTRODUCTION

7.4.1.1 Remifentanil has been identified as a safe and effective option of analgesia for use in the intranatal period. Acting within 1-2 minutes and suited to patient controlled administration, this offers another analgesia choice for women in labour.

7.4.2 INDICATIONS FOR REMIFENTANIL PCA

7.4.2.1 Remifentanil PCA is an alternative to pethidine in patients who do not want, or cannot have, an epidural. Currently it it may be used when epidural analgesia contraindicated and other forms of analgesia are insufficient. Should always be discussed with Anaesthetic coordinator or other senior anaesthetist.

7.4.2.2 Remifentanil is currently not licensed for use via PCA and so must be prescribed by an anaesthetist prior to setting up.

7.4.3 CRITERIA FOR USE

7.4.3.1 In general, any woman being offered remifentanil PCA should be more than 36 weeks gestation and be in established labour.

7.4.3.2 If remifentanil is being considered for use at a gestation of less than 36 weeks a senior obstetrician must document in the clinical notes either the non-viable status of the fetus or specify the reason for requesting remifentanil in that case.

7.4.3.3 Entonox may be used in addition.

7.4.3.4 SpO_2 monitoring must be established before the woman starts using the PCA and must be monitored continuously while the remifentanil PCA is being used.

7.4.3.5 Remifentanil observations on the MEOWs chart must be completed while the PCA is in situ.

7.4.3.6 **A midwife must be assigned to give one to one care. The patient should under no circumstances have access to the PCA if the midwife is not present.**

7.4.4 CONTRAINDICATIONS FOR REMIFENTANIL PCA

- Allergy to opioid drugs
- Multiple pregnancy
- Pre-eclampsia
- Other parenteral opioid administration within preceding four hours

7.4.5 PROFESSIONAL ROLES

7.4.5.1 Patient preparation:-

- The patient should be issued with, and have read, the remifentanil PCA patient information leaflet.

- The patient should be informed of the possible side effects including drowsiness, itch, nausea and dizziness.

- In particular the woman should be informed that approximately one woman in ten using remifentanil PCA will experience transient lowered oxygen saturation levels requiring the administration of additional oxygen via nasal specs.

- A dedicated intravenous cannula (22g Blue or 20g Pink) is required.

- Any other intravenous cannulae on the same arm should have an anti-reflux valve and any infusions delivered via a volumetric pump

- The patient should be shown how to use the PCA and should be told to press the button just before or at the start of a contraction

- A pulse oximeter (oxygen saturation) probe must be attached before the PCA is started.

7.4.5.2 Equipment required:-

- 50 ml bag saline
- 2 mg ampoule of Remifentanil
- **Dedicated remifentanil PCA pump set to deliver 1ml (40 mcg) bolus over 15 seconds with a 2 min lockout**
- anti-syphon extension set

7.4.5.3 Syringe preparation:-

1 Remifentanil solution to be reconstituted 2mg in 50ml 0.9% Saline

2 Final solution concentration to be 40 micrograms/ml of Remifentanil

*N.B. Remifentanil is stable for 24 hours at room temperature after reconstitution

7.4.6 OBSERVATIONS

- Remifentanil PCA observations on MEOWS chart to be completed for all women using Remifentanil
- This must include **every 30 mins documented time, pain score, sedation score, respiratory rate** and **SpO2**
- Continuous SpO_2 monitoring must be established prior to starting PCA and recorded on obs / MEOWs sheet
- CTG monitoring is not required unless otherwise indicated

NOTE: Sedation score is recorded on a modified AVPU scale:-

- **Alert/** slightly Drowsy
- **Voice**: Eyes closed but responds to Voice
- **Pain /Unresponsive**: Eyes closed but rousable by physical stimulus/ Pain/ Unresponsive

7.4.6.1 Indications for contacting the anaesthetist (bleep 2410):-

- A sedation score where there is no response to voice
- Respiratory rate of less than 8 breaths per minute
- SpO_2 remaining below 90% despite oxygen via nasal specs (max 2l/min)

7.4.6.2 Points of safety:-

- Always use a dedicated cannula
- Always flush the cannula after the PCA is removed with 5 ml saline
- Do not give any other drugs via the PCA cannula
- Only the patient is to use the PCA button
- The PCA button is not to be pressed by midwifery staff or the patient's relatives
- The PCA can be used during delivery and for the repair or tears and episiotomies
- The remifentanil containing syringe should not be connected to the patient unless it remains fully engaged in the syringe driver/ pump
- The anaesthetist should always be present for the 1st 4 patient presses of the remifentanil PCA

7.4.6.3 Apnoea

If there is a period of apnoea lasting > 10 seconds or respiratory rate less than 8 then the patient should be encouraged to breathe and the remifentanil bolus control removed from the patient. If there is still no respiratory response to verbal encouragement (e.g. by 20 seconds) help should be sought (pull emergency buzzer). The patient should be laid flat in full left lateral position and 100% oxygen administered (via a self-inflating bag, valve, facemask until return of spontaneous respiration or by hudson mask if making respiratory effort) until the arrival of the emergency team (including anaesthetist) to determine optimum airway management.

7.5 PCA regimen

Labour

Remifentanil 40mcg 2 min lockout

dilute 2mg up to 50ml with 0.9% Sal, 1ml bolus

see remifentanil guideline for usage

Post Caesarean GA

Morphine 1 mg 5 min lockout

dilute 100mg up to 50ml with 0.9% Sal, 0.5ml bolus

Fentanyl 10mcg 4 min lockout

dilute 500mcg up to 50ml with 0.9% Sal, 1ml bolus

All alternative to morphine; consider using if renal impairment

For IUD

Morphine 1 mg 5 min lockout

dilute 100mg up to 50ml with 0.9% Sal, 0.5ml bolus

Oxycodone 1 mg 5 min lockout

dilute 100mg up to 50ml with 0.9% Sal, 0.5ml bolus

Oxycodone may be used in women intolerant of morphine due to excessive nausea, vomiting or hallucinations

7.6 AWAKE FIBRE OPTIC INTUBATION.

TOTAL BUDGET- 9 mg/ Kg

Patient:

1) I.V. access
2) Monitoring
3) Sit as upright as possible
4) Otrivine (xylometazoline) to both nostrils
5) Glycopyrrolate 3 micrograms/ kg

Equipment:

1) Fibreoptic Scope
   a. Mount tracheal tube.
   b. Secure with tape
   c. Attach light source
   d. Check focus
   e. Check lenses are clean
   f. Lubrication (10mls NaCl 0.9%)
   g. sterets

2) Other
   a. Nebuliser mask
   b. Nasal oxygen cannulae
   c. Epidural catheter
   d. Lignocaine 4%
   e. Lignocaine 10%
   f. Co-phenylcaine 5%

Topical Anaesthesia

5mls 4% lignocaine via nebuliser **50 mg**

Inspect the nasal airway, left and right side

Co-phenylcaine (5% lignocaine and phenylephrine) spray 2mls to preferred nostril **100 mg**

Spray tonsillar pillars with 10% lignocaine 1 spray per side **20 mg**

Total 170 mg

Deduct this from total local anaesthetic budget and draw remaining budget into 2ml syringes with 4% lignocaine (1ml) and air (1ml).

Place an epidural catheter via the suction port of scope until tip is just visible.

Sedation (midazolam)

Use “spray as you go technique”

Administer local to cords until airway reactivity lost.

Visualise carina

Inject NaCl 0.9% between tube and scope.

Give scope to assistant and insert tube using a constant twisting movement.

Check tube position in relation to carina,

Remove scope and attach capnography.

Administer general anaesthetic.

NOTE TOTAL LOCAL ANAESTHETIC USAGE

7.7 TIVA

Only use if you are familiar with these techniques and after direct involvement of a senior anaesthetist. Typically this will be for Malignant Hyperpyrexia, using rocuronium rather than suxamethonium - check availability of sugummadex and perform a thorough airway assessment before starting.

Bristol 3 compartment model - ventilated patients and using nitrous oxide.
aims to achieve target blood conc 3 mcg/ml with 2 mins and maintain this
1mg/kg bolus followed by
10mg/kg/hr for 10mins (e.g. 60 kg = 1 ml/min)
8mg/kg/hr for 10mins
6mg/kg thereafter
additional boluses may be required depending on stimulation
NB this was based on fit patients premedicated with temazepam and 3mcg/kg fentanyl and in unpremedicated patients initial propofol target blood conc may need to be 5-6 mcg/ml
Similarly if co-infuse with remifentanil target propofol blood conc may be 2-2.5 mcg/ml

A simpler regimen is to deliver with a TCI Propofol (Marsh model) starting at 5-6 mcg/ml after preoxygenation and apply cricoid and give suxamethonium at loss of conciousness.

Occasionally TIVA is useful for high-risk patients - again with direct consultant supervision
One 'cardio-stable' for high risk patient only published regimen from a case report in IJOA 2007
Induction
A modified rapid sequence induction
A remifentanil infusion was started at 0.5 µg/kg/min (Minto)
then three minutes of pre-oxygenation,
then starting a target-controlled propofol infusion set at 2 µg/mL. (Marsh)
Cricoid pressure was applied following loss of consciousness and suxamethonium 100 mg given
Direct laryngoscopy then
Maintenance
50:50 oxygen-air mix
propofol at a target concentration of 2.5 µg/mL
remifentanil infusion target between 0.05 and 0.15 µg/kg/min