

OBSTETRIC OPINIONS

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Maternal Mortality Reports

Maternal Deaths in Australia, 2003-2005.

Australian Institute of Health and Welfare(AIHW). www.npsu.unsw.edu.au/NPSUweb.nsf/page/md3
MMR = 8.4 per 100,000 births.

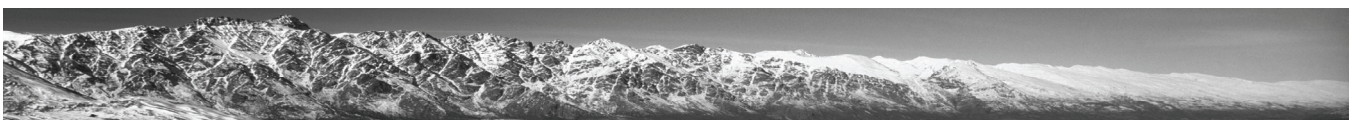
Cause of direct maternal deaths, Australia, 2003-2005	Number
Amniotic fluid embolism (AFE)	8
Hypertensive disorders of pregnancy	5
Thrombosis and thromboembolism	5
Obstetric haemorrhage	4
Cardiac conditions	3
Infection	1
Anaesthesia	1
Non-genital tract haemorrhage	1
Thrombotic thrombocytopenic purpura	1
Total	29

Cause of indirect maternal deaths, Australia, 2003-2005	Number
Cardiac conditions	10
Psychiatric causes	6
Non-obstetric haemorrhage	5
Infection	4
Hypertension	1
Other indirect causes	10
Total	36

Cardiac deaths, 2003-2005:

- 5 congenital.
- 2 primary pulmonary hypertension.
- 1 cardiomyopathy.
- 1 unidentified past surgery.
- 1 cause not fully identified.

Causes of maternal deaths, Australia, 1997 – 2005	Number (%)
Cardiac (direct and indirect)	32 (15%)
AFE	25 (12%)
Psychiatric	23 (10%)
Genital tract Haemorrhage	22 (10%)
(6th place -Anaesthesia	5 (2%))
Total	211



Confidential Enquiry into Maternal and Child Health (CEMACH), 2003-5
 International Journal of Obstetric Anesthesia. 17(2)(pp 103-105), 2008

54 years of continuous audit. This triennium: 132 direct and 163 indirect deaths. MMR = 13.9 per 100,000 births. Over half overweight or obese. Cardiac pathology is greatest killer. VTE 2nd. Anesthesia 8th in league of direct deaths. 6 directly due to anaesthesia: 2 in early pregnancy – obese. 1 post-spinal in morbidly obese developed respiratory failure post-op. 1 received intravenous infusion standard mix LA, arrested, died. 1 died as result of complication of CVL insertion. 100% “avoidable”. Too much (still) done by trainees.

Perinatal and Maternal Mortality in New Zealand, 2006

Perinatal and Maternal Mortality Review Committee. March 2009. www.pmmrc.health.govt.nz
 MMR = 23.5 per 100,000 births.

Cause of death		Number
Direct	AFE	3
	Postpartum haemorrhage	1
	Sepsis	2
Indirect	Suicide	4
	Intracranial haemorrhage	1
	Pre-existing medical condition	2
	Unclassifiable	1

Recommend:

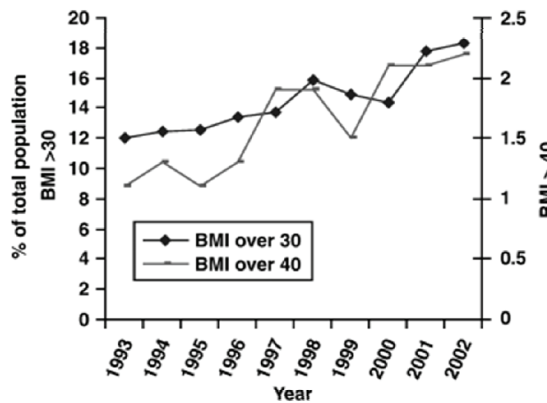
- Regular training in management of obstetric emergencies
- Massive transfusion protocol in response to major obstetric haemorrhage.

Obesity

NZ Health Survey 2006/7 www.moh.govt.nz/obesity	Adults	Children 2-14
Overweight (BMI>25)	36.3%	20.9%
Obese (BMI>30)	26.5%	8.3%

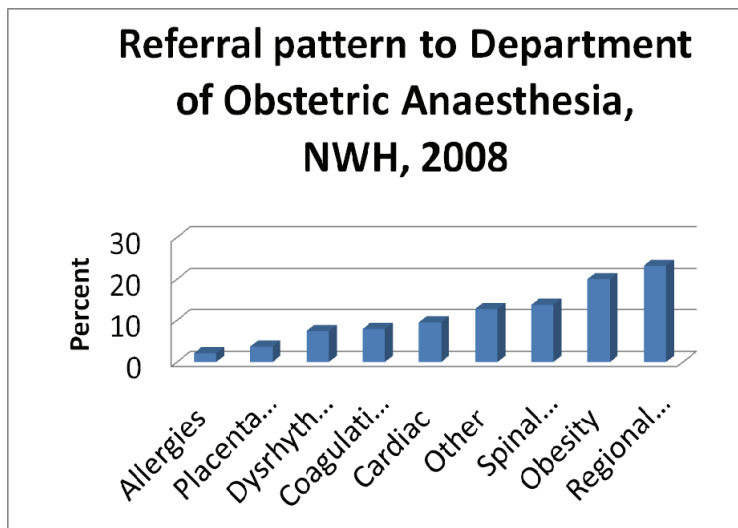
NZ Health Survey 2006/7 www.moh.govt.nz/obesity	Maori	Pacific Island	Asian
Obese (BMI>30)	41.7%	63.7%	11%

One billion overweight adults worldwide, 300 million of them obese.



Prevalence of Obesity among females aged 16-44 in England as measured by BMI (source: Health Survey for England 2002) from: Anaesthesia 2006, 61; 36-48





Average BMI – 48.4, min – 42, max – 64
 Referrals per year for obesity – 34; prevalence in our population of 7,500 del per year – 0.5%

Maternal Complications	Obstetric / Neonatal Complications
Gestational diabetes	Increased Perinatal Mortality
Hypertension (chronic and PIH)	Birth Defects
Urinary Tract Infection	Inadequate weight gain
Increased Caesarean Section rate	Prolonged Gestation
Anaesthetic Complications	Macrosomia
Blood loss >1000mls	Twins/Breech/Malpresentation
Prolonged Surgery	Dysfunctional labour patterns
Thrombophlebitis	Shoulder Dystocia
Wound Infection/Dehiscence	Birth Trauma
	Neonatal Hypoglycaemia

From Cohen SE in Schnider & Levinson's Anesthesia for Obstetrics, 2002

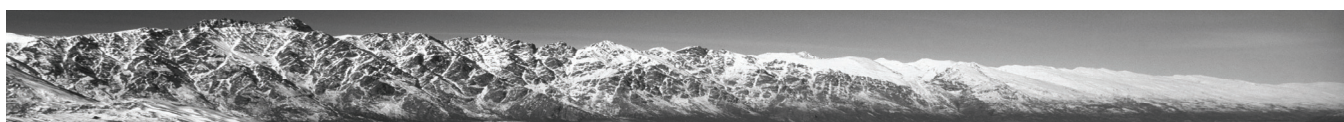
Labour analgesia for the obese:

Acta Anaesthesiol Scand 2008; 58: 6-19.

- ? more pain in the obese parturient.
- Risks with opioids – OSA.
- Preparation for operative delivery.
- Epidurals are more difficult.
 - No palpable landmarks.
 - Greater depth.
 - 74.4% need more than one attempt.
 - 14% needed more than three attempts.
 - 4% dural puncture rate (vs 0.5-1%).
 - Commonly fail and require re-insertion (46%).

Avoid general anaesthesia if possible:

- Early referral.
- Case planning.
- Predicting difficulty.
- Assessment includes:
 - Airway, IV access, regional options, Co-morbidities, OSA.
 - Counselling of time, difficulty, maternal vs fetal risk.
- Avoid a rush to intubate.
- Awake fibreoptic intubation.



- Monitor closely.
- Invasive monitoring: Arterial line / CVP.

Antenatal counselling for obese:

Naomi E Stotland, BMJ 2008;337:a2450.

- Higher rates of excessive weight gain.
- More likely to retain weight after pregnancy.
- Outcome (maternal and fetal) overall better if weight gain is less than 7kg (average – 13kg).
- Dietary and lifestyle advice in early pregnancy may improve outcome!!!

New Concepts in Labour Epidural Management

Comparison of computer-integrated patient-controlled epidural analgesia and patient-controlled epidural analgesia with a basal infusion for labour and delivery. *Anaesthesia & Intensive Care*. Vol 37, no. 1 (2009): 46-53. Sng BL, Sia AT, Lim Y, Woo D, and Ocampo C.

- Computer-integrated patient-controlled epidural analgesia (CIPCEA): increase (or decrease) background infusion according to number of demands in previous hour. Same total LA volume and per hour rate as PCEA with background infusion, better 'patient satisfaction.'

Patient-controlled epidural analgesia for labor. [Review] *Anesthesia & Analgesia* 108, no. 3 (2009): 921-8. Halpern SH, and Carvalho B.



- Background Infusion: Reduce workload (top-ups), may improve analgesia, no increase motor block. No benefit in avoiding.
- Ropivacaine vs Bupivacaine: Both work well. Ropivacaine MAY cause less motor block (though no study adequately accounts for differences in potency).
- Bolus dose volume and lockout: Larger doses and longer lock-out (12mls, 25mins) may improve analgesia if no background infusion, but? safety.
- Drug concentration: low concentration, higher volume reduces overall LA consumption without reducing analgesia or maternal satisfaction.
- Programmed Intermittent Epidural Bolus (PIEB): Two 6ml boluses per hour work better than an infusion of 12mls/hr – less top-ups (or PCEA boluses required), overall less LA needed, better maternal satisfaction. Possibly due to wider spread, higher injectate pressures.

Effect of epidural saline washout on regression of sensory and motor block after epidural anaesthesia with 2% lidocaine and fentanyl in elderly patients. *Anaesthesia* 64, no. 3 (2009): 273-6. Park EY, Kil HK, Park WS, Lee NH, and Hong JY.

- 30mls saline through epidural catheter post TUR surgery halved time to motor regression and significantly reduced time to sensory regression. **No** occurrence of possible side effects such as intracranial hypertension, increased CSF pressure, acute back pain, paraspinal muscle spasm, lower extremity radicular pain, nuchal pain, headache or temporary visual deficits.

Maintaining labour epidural analgesia: what is the best option? *Current Opinion in Anesthesiology* 21, no. 3 (2008): 263. Leo, S., and A. T.H Sia.



Cardiac Disease

The parturient with coronary heart disease:

- Case series of 6 plus review. Not much evidence to guide. Serial TTE, close monitoring and regional anaesthesia. Clopidogrel continued through pregnancy if indicated. Vaginal delivery and caesarean section both recorded whilst on clopidogrel and aspirin. Regional contraindicated if clopidogrel continued. Incidence of CHD in pregnancy 1 in 10,000, though expect more frequent as age and obesity increase. Beware Syntocinon – infusion not bolus in high risk.

Smith RL. Young SJ. Greer IA. International Journal of Obstetric Anesthesia. 17(1):46-52, 2008 Jan.

Practical management of the parturient with congenital heart disease:

- Risk of death or severe morbidity resulting from certain cardiac lesions in pregnancy.
- Plenty of good general advice about management of cardiac mums. Strong advocates of regional anaesthesia but any anaesthetic should be given slowly and carefully!

Low risk (mortality 0.1-1.0%)	<ul style="list-style-type: none"> ▪ Most repaired lesions. ▪ Uncomplicated left-to-right shunts. ▪ Mitral valve prolapse; bicuspid aortic valve; aortic regurgitation; mitral regurgitation; pulmonary stenosis; pulmonary regurgitation.
Intermediate risk (mortality 1-5%)	<ul style="list-style-type: none"> ▪ Metal valves. ▪ Single ventricles. ▪ Systemic right ventricle; switch procedure. ▪ Unrepaired cyanotic lesions. ▪ Mitral stenosis; mild/moderate aortic stenosis; severe pulmonary stenosis.
High risk (mortality 5-30%)	<ul style="list-style-type: none"> ▪ NYHA III or IV. ▪ Severe systemic ventricular dysfunction. ▪ Severe aortic stenosis. ▪ Marfan's syndrome with aortic valve lesion or aortic dilatation. ▪ Pulmonary hypertension (NB: mortality 30-50%).

Dob DP, Yentis SM. International Journal of Obstetric Anesthesia 15(2):137-44 2006 Apr.

Anaesthesia in parturients with heart disease: a five year review in an Australian tertiary hospital:

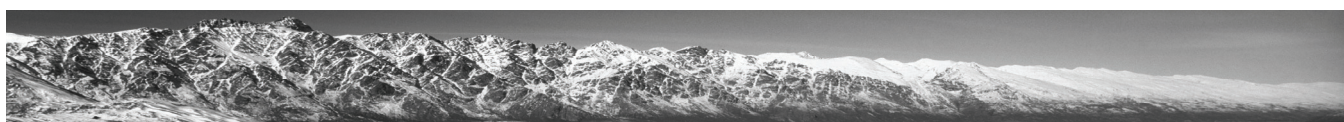
- Heart disease 3.1 per 1000 deliveries. 70% women with congenital, 25% with rheumatic and 3% with ischaemic heart disease. Delivery by obstetric indication. Regional anaesthesia common.

R. K. Boyle. International Journal of Obstetric Anesthesia 2003 12(3) 173-177.

Low-dose sequential combined spinal-epidural: an anaesthetic technique for caesarean section in patients with significant cardiac disease:

- 4 cases: pulmonary hypertension (65/33) and biventricular failure; HOCM; AS (valve area 0.7cm²) and CHD (60% stenosed LAD); MS (0.9cm²). Invasive monitoring. Low dose spinal then incremental epidural. Phenylephrine prn, no or low dose Syntocinon.

Hamlyn, E. L., C. A. Douglass, F. Plaat, J. A. Crowhurst, and G. M. Stocks. International Journal of Obstetric Anesthesia 14, no. 4 (2005): 355-361.



Remifentanil

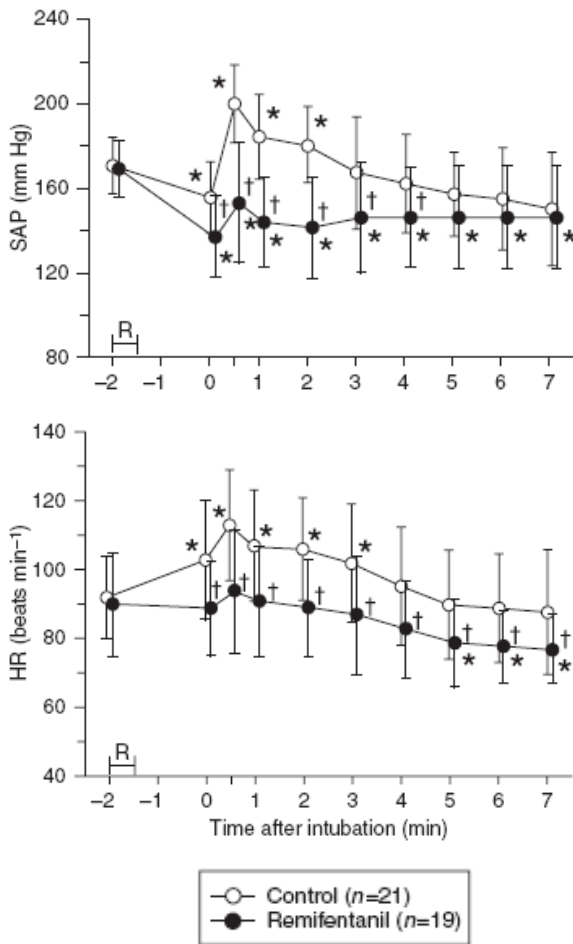
Onset time after bolus is 80 seconds, context-sensitive half-time is 3 minutes.

Remifentanil for cesarean section under general anesthesia: effects on maternal stress hormone secretion and neonatal well-being: a randomized trial:

- 0.5mcg/kg at induction, then 0.15mcg/kg/min until peritoneal incision vs. no opioid until after delivery. Modest decrease endocrine stress response, no difference in BP or HR. Lower ACTH after intubation, more flat babies requiring PPV, but none needing naloxone. Expect 10% of babies to need ETT, but they recover quickly and apgars are >8 at 5 mins.

Draisci, G. Valente, A. Suppa, E. Frassanito, L. Pinto, R. Meo, F. De Sole, P. Bossu, E. Zanfini, B A. International Journal of Obstetric Anesthesia. 17(2):130-6, 2008 Apr.

Maternal and neonatal effects of remifentanil at induction of general anesthesia for cesarean delivery: a randomized, double-blind, controlled trial:



- 1mcg/kg Remi or placebo 30s prior to RSI with Thio/Sux. No infusion. Significantly less HR and BP increase. Apgars similar but 2/20 neonates in Remi group were given naloxone by blinded paed.

Kee WD, Khaw KS, Ma KC, et al. Anesthesiology. 2006;104(1):14.

Effects of remifentanil on cardiovascular and bispectral index responses to endotracheal intubation in severe pre-eclamptic patients undergoing Caesarean delivery under general anaesthesia:

- All had Mg loading pre-op. 1mcg/kg bolus Remi/placebo 30s prior to RSI with Thio/Sux. No infusion. Significantly reduced HR and BP response to intubation. No differences in BIS. Catecholamines higher in control. Apgars lower at 1 min in Remi group, but same at 5 mins.

Yoo K, Jeong C, Park B, et al. British Journal of Anaesthesia. 2009;102(6):812-9.

General anaesthesia using remifentanil for caesarean section in parturients with critical aortic stenosis: a series of four cases:

- AV area 0.6 – 0.8cm². All Etomidate, Sux, 2-4mcg/kg Remi then infusion. Good CVS stability. Neonates slow resp at 1 min, good at 5 mins. All mothers extubated at end of LSCS. AV replacement 6-12 weeks post delivery.

Orme R, Grange C, Ainsworth Q, Grebenik C. International Journal of Obstetric Anesthesia. 2004;13(3):183-7.

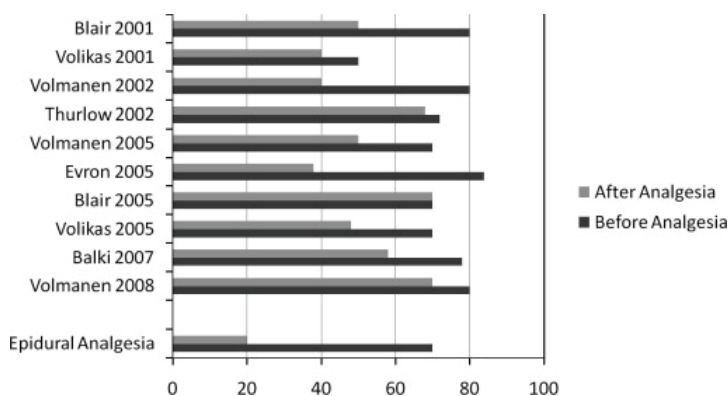


Controversy: Remifentanyl patient-controlled analgesia should (should not) be routinely available for use in labour. Hill D, Van de Velde M. *International Journal of Obstetric Anesthesia*. 2008;17(4):336-42.

Published data on efficacy of PCA remifentanyl in labour:

	Bolus dose (µg/kg)	Lockout time (min)	Median or reduction in pain scores (mm)	Conversion rate to regional analgesia
Blair	0.25-0.5	2	50 median	9.5%
Thurlow	0.20	2	48 median	38%
Volmanen	0.4	1	15 reduction	Not reported
Blair	40 µg	2	64 median	10%
Volmanen	0.2-0.8	1	42 reduction	Not reported
Evron	0.27-0.93	3	35 median	10.8%
Volikas	0.5	2	46 median	10%
Balki	0.25 + infusion	2	not reported	5%

- 'Usual' recipe – 40mcg bolus over 10 secs, 2 min lockout, no background. Larger bolus doses increase side effects (N+V). Background infusions have a limited additional effect and increase risk of sedation/respiratory depression. Overall 10% desaturate on air – most corrected by 2L/min nasal O₂. Recommend 1 to 1 midwifery care and continuous pulse oximetry.
- Fewer non-reassuring CTG traces and better neonatal neurobehavioural scores with remifentanyl than with pethidine. J.M. Blair, G.T. Dobson and D.A. Hill et al., Patient controlled analgesia for labour: a comparison of remifentanyl with pethidine, *Anaesthesia* 60 (2005), pp. 22–27.
- No studies have reported the need for neonatal naloxone or unexpectedly low Apgar scores after maternal remifentanyl in labour.



Visual analogue scale (VAS, mm) scores for labour pain before and after initiation of epidural analgesia or remifentanyl patient-controlled analgesia (PCA) in different studies. The VAS scores for epidural analgesia reflect what is usually reported in the literature.

NWH regime: Medima S-PCA syringe driver. Anaesthetist to set up and prescribe. Start at 0.5mcg per kilo (pre-pregnant weight), 2 min lockout, no background. Stay with woman for first 20 minutes of use. Requires continuous pulse oximetry and presence of midwife.

Obstetric Haemorrhage

Learning from adverse clinical outcomes: major obstetric haemorrhage in Scotland, 2003-05:

- Includes an analysis of risk factors, incidence and a useful list of "clinical lessons" and "examples of good practice" that resulted from an in-depth review of all cases of major obs haemorrhage throughout Scotland.

Brace V, Kernaghan D, Penney G. *British Journal of Obstetrics & Gynaecology*. 2007;114(11):1388-96.



Provision for major obstetric haemorrhage: an Australian and New Zealand Survey and Review:

- No surprises here. Big units have more facilities (on-site blood bank, ICU, resident anaesthetist). Stresses need for major haemorrhage protocol and practice drills.

Fowler SJ. *Anaesthesia & Intensive Care*. 2005;33(6):784-793.

Strategies to manage major obstetric haemorrhage. [Review]:

- 5% of births PPH>1000mls. LSCS increases subsequent risk of peripartum hysterectomy 6 times. Major obstetric haemorrhage = 1. EBL>2,500mls, 2. Transfusion of 5 or more units of blood, or 3. Treatment for coagulopathy.
- Succinct and well laid-out management plan for obstetric haemorrhage – diagnosis/assessment, help, monitor, resuscitate, stop the bleeding (including interventional radiology, cell salvage, tranexamic acid, rFVIIa).
- OAA, AAGBI and RCA all recommend the use of protocols and drills to improve the response to major obstetric haemorrhage.

Wise A, Clark V. *Current Opinion in Anaesthesiology*. 2008;21(3):281-7.

Cell Salvage

Cell salvage in obstetrics. [Review]:

- A comprehensive review. In essence it's a good thing, there have been no documented adverse outcomes from its use and it is recommended by a number of professional bodies. Avoid contamination with large amounts of amniotic fluid and use a leukocyte depletion filter.

Allam J, Cox M, Yentis SM. *International Journal of Obstetric Anesthesia*. 2008;17(1):37-45.

Introduction of cell salvage to a large obstetric unit: the first six months:

- Successful, but wide inclusion criteria for use meant relatively low volume replaced.

King M, Wrench I, Gallimberti A. *International Journal of Obstetric Anesthesia*. 2009;18(2):111-117.

Recombinant Factor VIIa

Recombinant factor VIIa in massive postpartum haemorrhage:

- Review. rFVIIa works by activating IX and X enhancing thrombin generation, localised to sites of vascular injury. Greatly reduces blood product requirements when used in non-obstetric haemorrhage. Recent case reports in Obs: 90-100mcg/kg, repeated every 2 hours. Ensure temp>35degs, pH>7.2, other coagulation factors present.
- "Consider use when blood loss exceeds 1.5 maternal blood volumes." ? use to 'save uterus' and to temporise whilst uterine arteries embolised.
- Thrombotic complications est. <1% in haemophilia patients.

Karalpillai D, Popham P. *International Journal of Obstetric Anesthesia*. 2006;16:29-34.

Use of recombinant activated factor VII in massive obstetric haemorrhage:

- 4 case reports of rFVIIa saving the day after heroic blood loss. Review: 44 other case reports of rFVIIa use in obstetric haemorrhage, some early in haemorrhage, some v late. Dose ranges from 15-120mcg/kg (mean 94mcg/kg).
- Theoretical model suggests that cost effective time to give rFVIIa is after 14 units of RBC's have been transfused (with associated coag factors/platelets).



Haynes J, Laffan M, Plaat F. International Journal of Obstetric Anesthesia. 2007;16(1):40–49.

Preeclampsia

Labetalol Versus Magnesium Sulfate for the Prevention of Eclampsia Trial (LAMPET):

- "Labetalol holds advantages over MgSO₄ in preventing eclampsia, early data suggest". OB/GYN News. FindArticles.com. 30 Jul, 2009.
- Aiming to recruit 4,000 women: Labetalol vs Magnesium in prevention of eclampsia. Prelim data on 200+ women – similar incidence of fits. Hypertension better controlled in Labetalol group.

Complications of Regionals

RCA audit report: Major complications of central neuraxial block: report on the Third National Audit Project of the Royal College of Anaesthetists:

- 700,000 central neuraxial blocks (CNB's) performed per year in NHS (Sept 2006) 45% (315,000) were obstetric. 4 cases of permanent injury/death (0.3-1.2 per 100,000 compared to overall figures of 2-4.2 per 100,000): 1 epidural abscess; 2 nerve injury; 1 miscellaneous. CSE and epidural more likely to cause harm than spinal or caudal.

Cook TM, Counsell D, Wildsmith JA. British Journal of Anaesthesia 102, no. 2 (2009): 179-90.

Amniotic Fluid Embolism

- 1) acute hypotension or cardiac arrest, 2) acute hypoxia, 3) coagulopathy, and 4) onset during labor, cesarean delivery or dilation and evacuation or within 30 min of evacuation of the uterus. 1 in 8,000 - 80,000. 25-37% mortality, high incidence neurological damage in survivors ?85%. neonatal mortality 20-25%. Probably an immunological disease (increased C3 and C4).

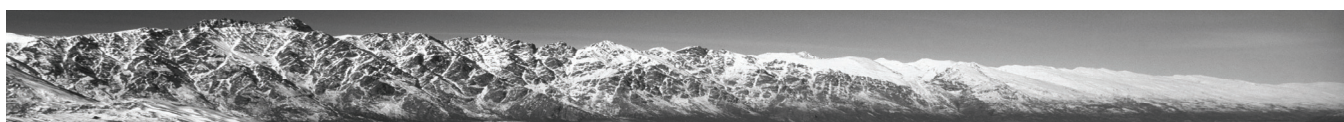
Signs or symptoms	Frequency
Hypotension	100%
Fetal distress	100%
Pulmonary oedema or ARDS	93%
Cardiopulmonary arrest	87%
Cyanosis	83%
Coagulopathy	83%
Dyspnoea	49%
Seizure	48%
Uterine atony	23%
Bronchospasm	15%
Transient hypertension	11%
Cough	7%
Headache	7%
Chest pain	2%

Differential Diagnosis of Amniotic Fluid Embolism

Obstetric causes
 Acute hemorrhage
 Placental abruption
 Uterine rupture
 Uterine atony
 Eclampsia
 Peripartum cardiomyopathy
 Anesthetic causes
 High spinal anaesthesia
 Aspiration
 Local anaesthetic toxicity
 Non-obstetric causes
 Pulmonary embolism
 Air embolism
 Anaphylaxis
 Sepsis/septic shock

- Treat: supportive – includes fluids, blood products, inotropes, invasive monitoring, early delivery of fetus, (TTE/TOE, CPB, ECMO, Nitric Oxide, IABPump, FVIIa – all reported in literature).

Gist RS et al. Anesthesia & Analgesia 108, no. 5 (2009): 1599-602.



Syntocinon

Intravenous oxytocin bolus of 2 units is superior to 5 units during elective Caesarean section:

- Less haemodynamic change, less N+V, no difference in uterine tone, blood loss or need for additional uterotonics.
- Why give more?

Sartain J, Barry J, Howat P, McCormack D, Bryant M. *British Journal of Anaesthesia*. 2008;101(6):822-6.

