Abstracts of free papers presented at the annual meeting of the Obstetric Anaesthetists' Association, Jersey, 21 & 22 May 2009

(The presenter is underlined)

ORAL PRESENTATIONS

O1 Catheter techniques succeed in scoliosis
S E Taylor, RC Wilson, H Mclure, G Lyons

O2 Increased incidence of pain on threading and bloody tap for BBraun epidural catheter compared to Portex
H Jeffery, TJ Wrench, R Porter

O3 Length matters! A review of 18,433 lumbar epidurals to assess optimal catheter length for labour analgesia
N Hollister, JC Barker, D Thorp-Jones, J Coghill

O4 The effect of epidural analgesia on breast feeding: analysis of a randomized controlled trial
MJA Wilson, C MacArthur, A Shennan

O5 A comparison of automated intermittent mandatory boluses with a basal infusion in patient-controlled epidural analgesia for labour and delivery
S Lee, CE Ocampa, Y Lim, ATH Sia

O6 Local anaesthetic requirements are increased by dystocia but not by prostaglandin-induced labour
PY Dewandre, C Sougne, V Bonhomme, JF Brichant

O7 Anaesthesia and pregnancy outcomes in cystic fibrosis: case series from one centre
S Quassim, S Dinesh, M Benham

O8 Study to determine the incidence of triggering using CEMACH-recommended modified early obstetric warning system (MEOWS)
S Leo, CE Ocampo, Y Lim, ATH Sia

O9 A non-interchangeable connector system to prevent accidental intravenous misconnection of epidural infusions on the labour ward
R Santhirapala, A Arora, JJ Carter, A Surendran, PJ Young

O10 What’s the damage? Litigation and neuraxial block in obstetric practice
H Boyce, F Plaat

O11 Spinal anaesthesia with levobupivacaine: does it allow fast-tracking?
M Vercauteren, MB Breebaart, HC Coppejans, D Van Doninck

O12 Randomised controlled trial comparing the effects of oxytocin i.v. bolus vs. oxytocin i.v. infusion on cardiac output during caesarean section
C Mollitt, A Ssenoga, C Grassman, PM Barclay

O13 A case series of successful videolaryngoscopic intubations in obstetric patients
K Gray, N Lucas, PN Robinson, B Loughnan, H Morris, K Rao, DJA Vaughan

O14 Preoxygenation in the obstetric and non-obstetric population: effectiveness of a new technique
R Baraz, RE Collis

O15 Service evaluation of preoxygenation for caesarean section under general anaesthesia
R Porter, JJ Wrench, R Freeman

POSTERS PRESENTATIONS

P1 A diagnostic dilemma for postpartum headache
A HL Lind, J Joseph, L Khor, E A Thornberry, R Vanner, D Gabrott, C Garcia-Rodriguez

P2 An audit of long-term sequelae of post dural puncture headache
A Natarajan, S Biswas, K Gray, DN Lucas, PN Robinson

P3 Anaphylaxis during cesarean section; the importance of a good history
CE Weininger, PD Levin

P4 The depth to epidural space and the incidence of accidental dural tap related?
N Hollister, D Thorp-Jones, J Coghill

P5 Carrying out an epidural blood pool: an OAA approved survey of national UK practice
S Eason, J Mörch-Sikkall
P6  Changing to an 18-gauge Tuohy needle can halve the incidence of severe PDPH
JB Sadashivaiah, G Lyons, R Wilson, H McLure

P7  CT-guided blood patching: an opportunity to reduce risk of additional dural puncture
M Armstrong, J Lermitte, H El-Madbouh, D Jeevaratnam

P8  Difficult intubation in parturients: myth or reality?
B Pujic, Jovanovic, S Milovanovic, A Otic, M Kendrisic

P9  Does bed rest vs. immediate mobilisation after epidural blood patch change efficacy?
TL Jones, R Fernando, AJ England

P10  Lipaemic CSF: a case of failed spinal anaesthesia
DG Nicolson, S Kadambande, RE Collis

P11  More tapping at night? A review of nocturnal risk of accidental dural puncture in epidural analgesia for labour
N Hollister, D Thorp-Jones, J Coghill

P12  The CUSUM method to detect abnormal rates of unintentional dural puncture
MJ Mackenzie, BJ Norman

P13  What mothers know, and want to know, about the complications of general anaesthesia
GNB Jackson, SM Yentis, M Woolnough, K Gough, A Naturajan, DN Lucas, PN Robinson

P14  A retrospective audit of early warning scores in the detection of critically ill obstetric patients
SR Tufail, EM Flavell, RE Collis

P15  A retrospective review of obstetric admissions to a tertiary referral liver intensive care unit
HJ Kave, VA Skelton, GD Allan

P16  A survey of obstetricians’ knowledge of aspects of acute care in maternity HDU patients
N Sabir, DJA Vaughan, DN Lucas, J Chan, S Bhuptani, PN Robinson

P17  A three-year survey of obstetric critical care admissions in a tertiary centre
NM Girish Sadhu, R Wadsworth, R Samangaya

P18  Survey of high dependency care on delivery suite: anaesthetists’ roles and views
MJ Mackenzie, BJ Norman

P19  Validity of a postoperative quality of recovery score after caesarean section: the FS-15
A Bright, T Tan, L Briggs

P20  A comparison of three ultrasound probes for imaging of the lumbar spine before caesarean section: a pilot study
B Munishankarappa, GA McLeod, J Fisher, G Corner, S Cochran

P21  A prospective study of epidural catheter migration: is there a correlation with patient size and time in situ?
N J Hollister, GK Simpson, J Thurlow

P22  Analgesia for labour at the Royal Free Hospital: a patient perspective
C Moss, R Simons

P23  Change from continuous infusion to patient-controlled epidural analgesia (PCEA) in a tertiary obstetric unit: impact on obstetric outcomes
KL Konrad, MJL Scrutton

P24  Does previous back surgery affect the success of obstetric regional anaesthesia and analgesia? A retrospective audit of 10 years experience in a district general hospital
SS O'Neill, H Edgcombe, R Jones

P25  How hard do you work? An analysis of anaesthetic interventions during three different epidural maintenance techniques for labour analgesia
G Peters, RS Smith, A Harvey, S Martin, E McGrady

P26  In-vitro spread of epidural infusion regimes: infusion vs PCEA bolus vs manual injection
MJ Gray, S Dinesh

P27  Management of epidurals in the late stages of labour: national survey of midwifery practice across the United Kingdom
R Dumpala, F Faulds, S Sagadai

P28  Predictive criteria of difficult Tuohy needle insertion during labour analgesia
J Guglielmiotti, A Chaieri, L Guezouli, B Wachowska, K Bedairia, E Bedairia, D Michel, P Montravers

P29  Preparation of spinal injectate, the danger of dead space: a survey of current practice
L Hulatt, C Wilson, M Davison

P30  Real-time ultrasound-guided epidural and spinal block for the obstetric patient
B Munishankarappa, GMcLeod, J Fisher, G Corner, S Cochran

P31  Regional analgesia for labour: a survey of UK practice
A Prabhu, F Plaat

P32  The influence of deprivation on mode of delivery and use of labour epidural analgesia
A Ankears, R Sashidharan
<table>
<thead>
<tr>
<th>ID</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>P33</td>
<td>Use of 'mobile epidurals' in the UK</td>
<td>A Prabh, F Plaat</td>
</tr>
<tr>
<td>P34</td>
<td>A four-year comparative outcome study of obese versus non-obese obstetric patients</td>
<td>N Uwubamwen, N M Girish Sadhu</td>
</tr>
<tr>
<td>P35</td>
<td>Body mass index and needle length for obstetric epidural techniques</td>
<td>H Murgatroyd, RC Wilson, H Mclure, GR Lyons</td>
</tr>
<tr>
<td>P36</td>
<td>Morbid obesity in obstetrics: a re-audit of CEMACH recommendations</td>
<td>A P Shannon, G M Yuill</td>
</tr>
<tr>
<td>P37</td>
<td>Obesity in obstetric anaesthetics: an audit of anaesthetic management</td>
<td>J D Griffin, D Portch, J Thurlow</td>
</tr>
<tr>
<td>P38</td>
<td>Outcome of super-obese parturients delivering at a tertiary obstetric unit</td>
<td>P Zaokumor, M Abdelgham, P Kochhar</td>
</tr>
<tr>
<td>P39</td>
<td>Should obstetric patients be weighed before anaesthesia?</td>
<td>A Kant, M Dresner</td>
</tr>
<tr>
<td>P40</td>
<td>Survey of existing anaesthetic guidelines for managing morbidly obese parturients in the North-West region</td>
<td>K Veerabadran, VK Melachuri, S Gandhi</td>
</tr>
<tr>
<td>P41</td>
<td>The effect of change in BMI during pregnancy on obstetric anaesthesia outcomes</td>
<td>S Desai, SL Maguire, MO Columb</td>
</tr>
<tr>
<td>P42</td>
<td>Trainee supervision for out-of-hours emergency caesarean section in the morbidly obese</td>
<td>C Eckersley, P Stone, J Reid</td>
</tr>
<tr>
<td>P43</td>
<td>Weight gain during pregnancy: review of practice?</td>
<td>S Sivasubramaniam, N Mathew, R Akhtar</td>
</tr>
<tr>
<td>P44</td>
<td>200% increase in conversion rate: audit of technique of anaesthesia for caesarean section</td>
<td>PN Gunasekera, M Purva, IF Russell</td>
</tr>
<tr>
<td>P45</td>
<td>Anaesthesia for caesarean section in premature infants</td>
<td>Y Stefak, TC Thomas, R Russell</td>
</tr>
<tr>
<td>P46</td>
<td>Are we getting the dose right? A survey of current regional anaesthesia practice for caesarean section in the West Midlands</td>
<td>S Gnanasekaran, M Shannugam, S Dinesh</td>
</tr>
<tr>
<td>P47</td>
<td>Cold to touch: has changing the way we test our spinal blocks changed our rescue analgesia and general anaesthesia conversion rates?</td>
<td>G K Simpson, J Thurlow</td>
</tr>
<tr>
<td>P48</td>
<td>Comparison of two doses of phenylephrine with crystalloid cohydration for prevention of spinal anaesthesia-induced hypotension during elective caesarean section: a double blinded randomised controlled study</td>
<td>T Ansari, M Hashem, A Razek, A Gamassy, A Saleh</td>
</tr>
<tr>
<td>P49</td>
<td>Continuous non-invasive blood pressure monitoring and phenylephrine infusion: a perfect combination for caesarean sections under neuraxial anaesthesia</td>
<td>M Doraiswami, P Paramban, A Whiteman, S Kapoor</td>
</tr>
<tr>
<td>P50</td>
<td>General anaesthesia in the obstetric patient: can we predict who will require it?</td>
<td>RJ Vickers, MS Reddy</td>
</tr>
<tr>
<td>P51</td>
<td>Infrared foot temperature measurement and assessment of epidural blockade for caesarean section</td>
<td>S Hussain, DG Nicolson, R Baraz, RE Collis</td>
</tr>
<tr>
<td>P52</td>
<td>Is general anaesthesia necessary to reduce diagnosis-to-delivery intervals for cord prolapse?</td>
<td>IR Mohamed Iqbal, CH Laxton, D Siassakos, Z Hasafa, T Draycott</td>
</tr>
<tr>
<td>P53</td>
<td>Lessons learnt: a 12-month prospective audit of decision-to-delivery times for class 1 caearean section</td>
<td>S J A Gold, R Martlew</td>
</tr>
<tr>
<td>P54</td>
<td>Measured angle of tilt achieved by an inflatable balloon wedge: is visual assessment a valid predictor?</td>
<td>B S Grewal, I Suri</td>
</tr>
<tr>
<td>P55</td>
<td>National survey of obstetric difficult airway guidelines and equipment</td>
<td>A Joseph, J Dedhia, M Mushambi</td>
</tr>
<tr>
<td>P56</td>
<td>Normal urine output after caesarean section</td>
<td>MJ Mackenzie, SM Yenti, M Woolnough, NA Barrett, MR Johnson</td>
</tr>
<tr>
<td>P57</td>
<td>Pre-printed labels for block height documentation after regional anaesthesia for caesarean section</td>
<td>A Mathews, F Webster, M Mushambi</td>
</tr>
<tr>
<td>P58</td>
<td>Retrospective study of 1602 obstetric intubations: predicting difficult and failed intubation using the Mallampati test</td>
<td>J Thompson, SS O'Neill, L Hutchings, R Jones</td>
</tr>
<tr>
<td>P59</td>
<td>Service evaluation of transversus abdominis plane block following caesarean section under subarachnoid anaesthesia with intrathecal diamorphine</td>
<td>B Edwards, E Puddy, I Wrench</td>
</tr>
<tr>
<td>Page</td>
<td>Title</td>
<td>Authors</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>P60</td>
<td>The accuracy of location of the cricothyroid membrane by the palpation method</td>
<td>SC Ng, N Salah, N Aslani, N Hayes, C McCaul</td>
</tr>
<tr>
<td>P61</td>
<td>The case for abandoning dermatome maps for caesarean section under regional anaesthesia</td>
<td>P S Shetty, S M Yentis</td>
</tr>
<tr>
<td>P62</td>
<td>An audit of interventional radiology in the management of obstetric haemorrhage</td>
<td>S Bageh, J Reidy, K Langford, G O'Sullivan</td>
</tr>
<tr>
<td>P63</td>
<td>Audit of autologous and allogenic blood use in obstetrics</td>
<td>E Powell, N Osborn</td>
</tr>
<tr>
<td>P64</td>
<td>Haemodynamic effects of a bolus or infusion of oxytocin: a randomised double-blind trial</td>
<td>E Van den Enden, J Lahousse, R Devlieger, E Vandermeersch, M Van de Velde</td>
</tr>
<tr>
<td>P65</td>
<td>Haemorrhage after vaginal delivery: a 12-year retrospective survey</td>
<td>S Quaglia, A Morra, A Zito, C Pasqualini, M Demichel, E Gollo</td>
</tr>
<tr>
<td>P66</td>
<td>Implementing cell salvage for non-emergency caesarean sections</td>
<td>C Ralph, J Faulds, I Sullivan</td>
</tr>
<tr>
<td>P67</td>
<td>Interventional radiology for uterine bleeding</td>
<td>JC Barker, E Drake, R Miles, IR Anderson</td>
</tr>
<tr>
<td>P68</td>
<td>Interventional radiology in the management of obstetric haemorrhage: an OAA survey of UK maternity units</td>
<td>VJ Webster, R Stewart, MJA Wilson</td>
</tr>
<tr>
<td>P69</td>
<td>Jehovah’s Witnesses: a six-year experience in a tertiary obstetric unit</td>
<td>L Feddy, E Selvarraasan, P Zuokumor, P Kochhar</td>
</tr>
<tr>
<td>P70</td>
<td>Management of 69 consecutive cases of suspected placenta accreta</td>
<td>CF Weimiger, C Weissman, Y Ginosar, T Elram, L Eid</td>
</tr>
<tr>
<td>P71</td>
<td>Maternal haemodynamics at elective caesarean section following oxytocin 5-unit bolus and placebo infusion compared to oxytocin 5-unit bolus and 30-unit infusion</td>
<td>B Munishankarappa, GA McLeod, H MacGregor, D Murphy</td>
</tr>
<tr>
<td>P72</td>
<td>Post-partum haemorrhage admissions to critical care: completing the audit cycle</td>
<td>A D Evans, L Rees, R E Collis</td>
</tr>
<tr>
<td>P73</td>
<td>Prophylactic uterine artery balloon catheters for suspected placenta accreta</td>
<td>M G Williams, G Lyons, H McLure, R Wilson</td>
</tr>
<tr>
<td>P74</td>
<td>Use of cell salvage during caesarean section in patients with placenta praevia</td>
<td>S Singaravelu, S Malliah, P Barclay</td>
</tr>
<tr>
<td>P75</td>
<td>Caesarean hysterectomy in a patient with severe mitral stenosis and placenta accreta: a case report</td>
<td>D Morland, W Wight, J Waugh</td>
</tr>
<tr>
<td>P76</td>
<td>Caesarean section in a patient with mediastinal B-cell lymphoma and haemophilia A</td>
<td>S Eason, W Wight</td>
</tr>
<tr>
<td>P77</td>
<td>Cardiac ischaemia and troponin rise in a structurally normal heart: should peri-partum chest pain be more aggressively investigated?</td>
<td>KC Tatham, Y Hughes-Roberts*, SW Davies*, M Cox</td>
</tr>
<tr>
<td>P78</td>
<td>Case report: severe mitral stenosis diagnosed on the second post-operative day following elective CS</td>
<td>MW Turner, J Curtis</td>
</tr>
<tr>
<td>P79</td>
<td>Intravenous nitroglycerin foruterine inversion: successful management of four cases and a literature review</td>
<td>S Irikoma / Shingo</td>
</tr>
<tr>
<td>P80</td>
<td>Management of acute dissecting thoracic aortic aneurysm in full term pregnancy: a case report</td>
<td>A Srivastava, J Kendall</td>
</tr>
<tr>
<td>P81</td>
<td>Management of multiple caesarean sections in a parturient with Conradi Hunermann syndrome</td>
<td>N Syed, S Kuchi, J Stone, S Francis, M Mushambi</td>
</tr>
<tr>
<td>P82</td>
<td>Ogilvie’s syndrome and intestinal obstruction after caesarean section: a case report and guideline review</td>
<td>P A Laloo, S Ouasim</td>
</tr>
<tr>
<td>P83</td>
<td>Parturients with prolonged QT interval: a series of deliveries</td>
<td>E Drake, R Preston, J Douglas</td>
</tr>
<tr>
<td>P84</td>
<td>Origins of OAA abstracts published in IJOA</td>
<td>LA Arrandale, GNB Jackson, MJ Mackenzie, SM Yentis</td>
</tr>
<tr>
<td>P85</td>
<td>The International Journal of Obstetric Anesthesia: more cited now indexed</td>
<td>GNB Jackson, SM Yentis</td>
</tr>
<tr>
<td>P86</td>
<td>Types of abstract presented at OAA meetings</td>
<td>LA Arrandale, MJ Mackenzie, GNB Jackson, SM Yentis</td>
</tr>
<tr>
<td>Page</td>
<td>Title</td>
<td>Authors</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>P87</td>
<td>Types of article published in IJOA since inception</td>
<td>MJ Mackenzie, SM Yentis</td>
</tr>
<tr>
<td>P88</td>
<td>An investigation into pain catastrophizing scores and previous labour outcomes in multiparous women</td>
<td>S J Fox, J Humphreys, I Lieberman</td>
</tr>
<tr>
<td>P89</td>
<td>HIV in pregnancy: a retrospective study</td>
<td>V Adriaens, A Pexsters, R Devlieger, E Vandermeersch, M Van de Velde</td>
</tr>
<tr>
<td>P90</td>
<td>National survey of the availability of translator services</td>
<td>M A Rafi, U Misra, Z Arfeen</td>
</tr>
<tr>
<td>P91</td>
<td>OAA epidural information card: is it useful?</td>
<td>S Thunga, A Khader, R Sashidhanan</td>
</tr>
<tr>
<td>P92</td>
<td>Serial measurements of neonatal cardiac output following caesarean section using Doppler ultrasound: establishing reference ranges</td>
<td>TL Jones, R Fernando, S McDonald, A Stewart, M Columb</td>
</tr>
<tr>
<td>P93</td>
<td>Short- and long-term effects of fetal nociceptive stimulation on pain response of rat pups in neonatal life</td>
<td>V Piot, F De Buck, L Sbragia, J Deprest, M Van de Velde</td>
</tr>
<tr>
<td>P94</td>
<td>Survey of obstetric anaesthetic workforce provision in units with greater than 5000 deliveries per annum</td>
<td>S J Fox, J Plummer</td>
</tr>
<tr>
<td>P95</td>
<td>TEG demonstrates that unfractionated heparin has no anticoagulant activity after caesarean section</td>
<td>HMM Boyce, J Ng, H Hume-Smith, MO Columb, GM Stocks</td>
</tr>
<tr>
<td>P96</td>
<td>The influence of antenatal class attendance on maternal anxiety</td>
<td>J Dolan, S Young, J Kinsella</td>
</tr>
<tr>
<td>P97</td>
<td>The Mental Capacity Act and labour</td>
<td>GNB Jackson, SM Yentis, T Sensky</td>
</tr>
<tr>
<td>P98</td>
<td>The use of oxytocin in labor and fetal cerebral blood flow variation</td>
<td>E Shifman, A Ivshin, S Floka</td>
</tr>
<tr>
<td>P99</td>
<td>Clinical evaluation of the effect of alfentanil patient-controlled intravenous analgesia in labour on Apgar scores</td>
<td>R Dobson, IJ Wrench, E Puddy</td>
</tr>
<tr>
<td>P100</td>
<td>Obstetric outcomes before and after the introduction of a remifentanil patient-controlled analgesia service</td>
<td>PM Foley, DA Hill</td>
</tr>
<tr>
<td>P101</td>
<td>Remifentanil analgesia for labour: clinically useful with acceptable side effects</td>
<td>TO Tveit, JH Rosland</td>
</tr>
</tbody>
</table>
**O1 Catheter techniques succeed in scoliosis**
S E Taylor, RC Wilson, H McLure, G Lyons
_Obstetric Anaesthesia, St James's University Hospital, Leeds, UK_

**Introduction:** In 2002 we reported a series of 41 women with scoliosis requiring analgesia and anaesthesia for labour and delivery. The caesarean section rate was 69% and continuous spinal anaesthesia was the commonest regional technique used (46%) but a second technique was needed in 16.6% of cases. We now report a further series demonstrating a simpler approach in this challenging population.

**Methods:** Records of women with scoliosis (with and without surgical instrumentation) delivering between 2001 and 2008 were reviewed.

**Results:** Forty-nine women produced 51 episodes for analysis. Thirteen women had elective caesarean sections and 38 laboured. Total numbers and outcomes are displayed in the flow charts below. Values in brackets represent women who had undergone surgical correction of their scoliosis.

**Conclusions:** We have stopped using CSA in labour but catheter techniques seem to give better results for these women than SSS, which had a failure rate of 28%. Both these women had surgically corrected scoliosis. The need for a second technique (GA) in this series was 3.9%.

**Reference**

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**O2 Increased incidence of pain on threading and bloody tap for BBraun epidural catheter compared to Portex**
H Jeffery, JJ Wrench, R Porter
_Anaesthesia, Royal Hallamshire Hospital, Sheffield, UK_

**Introduction:** We changed the epidural catheters that we use in our unit from Portex® to BBraun perifix® standard. Following this there was anecdotal evidence that there were increased incidences of bloody tap and pain on catheter insertion. In order to assess whether a problem existed we performed a service evaluation.

**Methods:** We identified 100 patients who had received epidural analgesia whilst we were using Portex catheters and a further 100 from the period that we started to use BBraun catheters. The notes for these patients were retrieved and a standard dataset recorded.

**Results:** The number of instances of bloody tap on threading the epidural catheter was 15 and 5 for BBraun and Portex respectively ($P=0.018$, $\chi^2$). The number of instances of pain on threading of the epidural catheter were 14 and 3 for BBraun and Portex respectively ($P=0.005$, $\chi^2$).

**Conclusion:** The stiffer BBraun catheter causes an increased incidence of side effects. We are currently assessing the BBraun Perifix® one catheter to use in our epidural packs.

**References**
1. B. Braun Epidural Products UK
   http://www.bbraunusa.com/perifix/index.html
O3 Length matters! A review of 18,433 lumbar epidurals to assess optimal catheter length for labour analgesia

N Hollister, IC Barker, D Thorp-Jones, J Coghill
Department of Anaesthesia, Derriford Hospital, Plymouth, UK

Introduction: The use of epidural analgesia for women in labour is common. However incomplete analgesia is a significant problem. Previous smaller studies have implicated catheter length as a cause of incomplete analgesia with varying advice on the optimal length of catheter to be left (1 to 8 cm quoted). We set out to determine what length was associated with the least incidence of incomplete analgesia.

Methods: Data were gathered from a database of 18,433 epidurals performed over a 15-year period. Epidurals were performed using a standardised 16-gauge Tuohy needle and catheter (Portex Minipack Smiths Medical ASD USA). Length of catheter in epidural space was recorded and patient analgesia assessed within 24 h by an obstetric anaesthetist. The database was analysed for documentation of unilateral, patchy, missed segment blocks, complete failure or a need to re-site, poor block and low block. The incidence of catheter loss (falling out) was also analysed. Microsoft SPSS and $\chi^2$ tests were used to analyse the data.

Results: Analgesia was incomplete in 6.7% of labour epidurals. The results demonstrated a statistically significant variation in risk of poor analgesia ($P<0.001$) and a U-shaped distribution curve with increasing catheter length (fig 1). The risk of epidural catheter loss decreased with increasing length ($P<0.001$). The risk of unilateral analgesia is significantly different for different lengths of catheter, the optimal length being 4-5 cm in space ($P<0.001$).

Discussion: Length does matter. We recommend when using multi-orifice catheters to insert no less than 4 but no greater than 8 cm of catheter into the epidural space. This is supported in previous smaller studies.

References

O4 The effect of epidural analgesia on breast feeding: analysis of a randomized controlled trial

MJA Wilson, JC Barker, A Shennan,†
Anaesthesia, Royal Hallamshire Hospital, Sheffield, UK, †Epidemiology, Birmingham University, Birmingham, UK, †Obstetrics, King’s and St Thomas’, London, UK

Introduction: Breastfeeding provides optimal infant nutrition. It is controversial whether labour epidural analgesia per se or epidural fentanyl effects breast feeding. We conducted an analysis of the Comparative Obstetric Mobile Epidural Trial, which examined breast feeding as a secondary outcome.

Method: 1054 nulliparous women were randomized to receive high-dose epidural (control), combined spinal-epidural (CSE) or low-dose infusion (LDI). A non-epidural comparison group was matched to recruits for parity, delivery mode and ethnicity. Women were interviewed 24-48 h after delivery and asked whether they had attempted to breast feed. At 12 months postpartum women were asked by postal questionnaire whether they had breast fed and to estimate how long. Women in the comparison group were divided into those who had received pethidine and those who had used other analgesia or none. Regression analysis was performed to determine variables that independently predicted breast feeding initiation. Kaplan-Meier analysis was conducted for feeding duration.

Results: A similar proportion of women in each epidural group and comparison group (no pethidine) had initiated breast feeding at the time of interview. Women in the non-epidural comparison group (pethidine) reported a lower initiation rate ($P=0.002$).

<table>
<thead>
<tr>
<th></th>
<th>Control n=353</th>
<th>CSE n=351</th>
<th>LDI n=350</th>
<th>Non-epidural comparison n=351</th>
</tr>
</thead>
<tbody>
<tr>
<td>Records</td>
<td>349</td>
<td>348</td>
<td>344</td>
<td>No Peth.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>231</td>
<td>230</td>
<td>217</td>
<td>Peth.</td>
</tr>
<tr>
<td></td>
<td>(66.2)</td>
<td>(66.1)</td>
<td>(63.1)</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(66.0)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(55.6)*</td>
</tr>
</tbody>
</table>

Older age groups ($P<0.001$) and non-Caucasian ethnicity ($P<0.026$) were independently predictive of breast feeding. Epidural fentanyl, delivery mode and trial group were not predictive. Mean survival times for breast feeding in weeks were similar across epidural groups (control 13.3, CSE 15.5, LDI 15.0) and comparison (pethidine) (13.9). There was a trend for women in the comparison group (no pethidine) to breast feed longer (mean 18.0 weeks 95% CI 14.9-21.1) although this difference was not statistically significant.

Conclusions: Our findings do not support the hypothesis that epidural analgesia or neuraxial opioids reduce breast feeding initiation.

Reference
O5 A comparison of automated intermittent mandatory boluses with a basal infusion in patient-controlled epidural analgesia for labour and delivery

S Leo, CE Ocampo, Y Lim, ATH Sia
Women's Anaesthesia, KK Women's and Children's Hospital, Singapore, Singapore

Introduction: Intermittent automated mandatory boluses (AMB) when used in place of a continuous basal infusion (BI), have been shown to reduce overall local anaesthetic consumption without compromising analgesic efficacy in patient-controlled epidural analgesia (PCEA). We modified our previous PCEA+AMB program to ensure a more consistent delivery of automated boluses every hour regardless of the number of patient-administered boluses given. We hypothesized that the modified PCEA+AMB regimen could reduce breakthrough pain requiring epidural supplementation in comparison with PCEA+BI.

Method: We recruited 62 healthy ASA I nulliparous parturients in early labour. After induction by combined spinal-epidural (CSE) technique, the parturients were randomised into two groups: Group PCEA+BI received a PCEA with basal continuous infusion 5 mL/h. Group PCEA+AMB received 5-mL automated mandatory boluses (AMB) every hour instead of a basal infusion. Unlike the previous regimen, if there was a successful PCEA self-bolus, the next AMB bolus would be delivered 30 min later, and every hour thereafter. Block characteristics, incidence of breakthrough pain requiring epidural supplementation, side effects, obstetric outcomes, Apgar scores and overall maternal satisfaction with analgesia were noted.

Results: There were no differences in baseline demographic data, pre-block obstetric data or incidence of breakthrough pain requiring epidural supplementation between the two groups. The time-weighted hourly consumption of ropivacaine was significantly lower in the PCEA+AMB group (mean 7.6 mL, SD 3.2) compared to the PCEA+BI group (mean 9.3 mL, SD 2.5) (P<0.001). The mean duration of analgesia following CSE was significantly longer in the PCEA+AMB group (mean survival time: 268 min, 95%CI [198-339]) compared to the PCEA+BI group (mean 104 min, 95%CI [84-125], P<0.001 by log rank test). Parturients in Group PCEA+AMB had higher satisfaction scores than those in Group PCEA+BI. Maternal side effects, obstetric and neonatal outcomes were similar in the two groups.

Conclusion: PCEA+AMB confers greater patient satisfaction and more prolonged spinal analgesia after CSE than PCEA+BI, despite reduced analgesic consumption. PCEA+AMB is a good alternative to PCEA+BI to maintain labour epidural analgesia.

References

O6 Local anaesthetic requirements are increased by dystocia but not by prostaglandin-induced labour

PY Dewandre, C Sougne, V Bonhomme, JF Brichant
Anesthesia, CHU-CHR Citadelle, Liege, Belgium

Introduction: Induced labour is associated with increased epidural sufentanil requirements2 and with an increased risk of caesarean delivery for dystocia. Women who develop dystocia leading to caesarean section have an increased epidural local anaesthetic requirement in early labour than those who will deliver vaginally. The aim of the present study was to investigate whether an increased local anaesthetic requirement is observed in prostaglandin-induced labour and whether it is related to subsequent dystocia or to labour induction itself.

Methods: With ethics committee approval, 154 consenting nulliparous women at >37 weeks of gestation and requesting labour epidural analgesia were included in this prospective randomized double blind study. They were randomly allocated to one of four groups: vaginal delivery after spontaneous labour (VS), vaginal delivery after induced labour (VI), caesarean section for dystocia after spontaneous labour (CS) and caesarean section for dystocia after induced labour (CI). Modified up-down sequential allocation was used to determine minimum local analgesic concentration (MLAC) of ropivacaine. The modification consisted in adding a criterion for rejection: a woman who did not deliver by the assigned mode was “rejected” from the study. The MLAC of ropivacaine and its 95% CI were calculated using probit regression analysis.

Results: Women’s characteristics were similar in the four groups. Among the 154 recruited women, 63 were excluded. Induced labour was not associated with an increased MLAC of ropivacaine (0.099 vs 0.083, P>0.05). Women who delivered vaginally had a significant 29% and 33% lower MLAC of ropivacaine than those who needed caesarean section after spontaneous or induced labour, respectively (figure).

Discussion: This study confirms the increased local anaesthetic requirement in women who will develop dystocia, but does not confirm previously reported increased analgesic requirements associated with prostaglandin-induced labour. This increase could be related to an increased incidence of dystocia (not reported) and not to the induction of labour itself.

References
3. Panni MK, Segal S. Local anesthetic requirements are greater in dystocia than in normal labor. Anesthesiology 2003; 98: 957-63.
O7 Anaesthesia and pregnancy outcomes in cystic fibrosis: case series from one centre

S Quasim, S Dinesh, M Benham
Department of Anaesthesia, Heart of England NHS Foundation Trust, Birmingham, UK

Introduction: Cystic fibrosis (CF) is an inherited autosomal recessive disorder with a median survival of over 35 years of age. About 100 women with CF become pregnant every year. The aim of this study was to review pregnancies of women with CF in one of England’s 18 adult CF centres.

Method: We retrospectively examined case notes of all CF parturients between 2000 and 2008. We categorized CF status (e.g. genotype, pancreatic, hepatic, diabetic status). Outcome measures included changes in weight/BMI, spirometry and number of hospitalizations during pregnancy. We recorded intrapartum anaesthetic management and maternal/fetal complications.

Results: There were 14 parturients with symptomatic CF genotypes in the study period. Mean age of conception was 27 years (16-38 years). Severe preeclampsia at 23 weeks of gestation necessitated medical termination in one woman. Seven parturients required insulin during pregnancy, or BMI (table). Outcome was successful even in one patient with type II respiratory failure on home oxygen, with % predicted FEV\textsubscript{1}=1%. Another two parturients required home oxygen from 25 and 29 weeks. Two parturients did not gain weight despite enteral feeding.

<table>
<thead>
<tr>
<th>Pre-conception</th>
<th>First post-natal CF clinic</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Mean (Range)</td>
<td>N Mean (Range)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>14 58.6 (39.0-87.0)</td>
</tr>
<tr>
<td>BMI (kg/m\textsuperscript{2})</td>
<td>14 22.6 (17.6-31.2)</td>
</tr>
<tr>
<td>% Predicted FEV\textsubscript{1}</td>
<td>13 56 (11-96)</td>
</tr>
</tbody>
</table>

Eight parturients delivered at term (3 NVD; 1 emergency caesarean section for obstetric reason; 3 elective caesarean sections; 1 unknown). There were 5 preterm deliveries (1 NVD after spontaneous labour; 4 caesarean section, 2 for reasons related to CF, one for preeclampsia, one unknown). There was one maternal death on day 36 postpartum due to multigorgan failure. GA was avoided in all cases.

Conclusion: Good maternal/fetal outcome is possible for most parturients with CF, even if spirometry and BMI are low. Preterm birth was more common than in other reports. We used regional anaesthesia in all caesarean sections, avoiding potential complications of GA. Finally, a joint obstetric/CF clinic concentrates expertise to manage this challenging group and facilitates early anaesthetic referral and counseling.

References

O8 Study to determine the incidence of triggering using CEMACH-recommended modified early obstetric warning system (MEOWS)

M Kodikara, A P McGleenan
Dept of Anaesthesia, Royal Free, London, UK

Introduction: The 2003-2005 Confidential Enquiry into Maternal and Child Health (CEMACH) encouraged “the routine use of a national obstetric early warning chart”. Our unit trialled the use of the CEMACH example in its observation charts. "Triggering" occurs by recording a single markedly abnormal observation (red trigger) or by the combination of two mildly abnormal observations (2 yellows). Triggering produces a medical review. We wanted to assess the impact on the medical workforce by estimating the frequency that patients trigger and to see which modalities trigger more often.

Method: We observed 500 12-h periods of data. Patients on labour ward, triage, obstetric high-dependency unit and the post-natal ward were included. Only charts with complete 12-h periods of data were included. The presence of any trigger in the period was recorded. The observation that triggered was noted.

Results: 500 12-h periods were observed in 303 separate patients. In 101 periods there was a minimum of one trigger giving an average rate of 0.2 triggers/12-h period. Due to multiple triggering variables within the same 12-h period, the total number of triggers was 203 (125 red and 78 two yellows). A single red trigger occurs in 62% of cases.

<table>
<thead>
<tr>
<th>Modality</th>
<th>Red</th>
<th>Yellow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Low</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Systolic Blood Pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>57</td>
<td>24</td>
</tr>
<tr>
<td>Low</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Diastolic Blood Pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>38</td>
<td>26</td>
</tr>
<tr>
<td>Low</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Heart Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Low</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Low</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Total: 125 (61.6%) 78 (38.4%)

Discussion: An average unit with 40 women resident in 24 hours will have nearly 16 triggering episodes - a huge impact on the workforce. During data capture, our unit admitted three women to the ICU - far fewer than the number identified by MEOWS. We suspect MEOWS identifies potentially sick patients in the maternity service, but has a high false positive rate. We noted an uneven dispersion of triggering modalities and postulate that the blood pressure trigger values are incorrectly set.

Reference
O9 A non-interchangeable connector system to prevent accidental intravenous misconnection of epidural infusions on the labour ward

R Santhirapala, A Arora, JJ Carter, A Surendran, PJ Young
Department of Anaesthesia, The Queen Elizabeth Hospital, King’s Lynn, UK

Introduction: Inadvertent intravenous administration of local anaesthetic agent is a potentially fatal iatrogenic complication. The UK National Patient Safety Agency identified three deaths between the years 2000 and 2004 as a result of this error.1 A recent survey2 found that nearly one quarter of the obstetric units in the UK have experience of wrong route drug errors, related to confusion between systems for intravenous and regional drug administration. This paper examines one possible solution to this problem. Currently the Luer-lock connector is ubiquitous, allowing all infusion lines to be connected to intravenous cannulae without impediment. A new, non-interchangeable connector system (NICS) that makes intravenous misconnection impossible has been developed. The NICS connector has three projections that have a smaller circumference than the standard Luer female lip. The male NICS connector has a corresponding disc with a key structure allowing engagement of the three projections but preventing engagement with a standard female Luer connector.

Fig 1: NICS

Methods: We conducted an observational survey among 52 multidisciplinary staff in two obstetric units to assess the ease of use of a prototype NICS connector. Ease of connection was compared with that of a standard Luer connector using visual analogue scales. The time taken to connect each system was also recorded.

Results: All staff successfully connected the NICS at first attempt. There was no significant difference in the ease of use between the NICS and standard connector, or the time taken to connect each. All staff found it impossible to attach the NICS to an intravenous line.

Discussion: Local anaesthetic solutions must ideally be delivered through infusion sytems that eliminate the risk of accidental intravenous connection. The system described here fulfils this requirement and is without any disadvantage.

References

O10 What’s the damage? Litigation and neuraxial block in obstetric practice

H Boyce, F Plaat
Dept of anaesthesia, Queen Charlotte’s and Chelsea Hospital, London, UK

Introduction: Obstetric nerve palsies were first described in 1832 whereas regional blockade was not used in obstetrics until the following century. Since then, however, the finger of blame has frequently been pointed at the anaesthetist when damage occurs.

Method: When a legal claim is made against a trust the NHS Litigation Authority, [NHSLA] becomes involved. Under the Freedom of Information Act we were granted access to data from the NHSLA in order to review incidents that resulted in a legal claim.1 The data should not be viewed as fully robust but do provide some useful findings.

Results: Between 1995 and 2008, 77 claims involving nerve damage in obstetric patients were reported to the NHSLA; 54 of the 77 had an anaesthetic component in their case summary. Of these 22 led to a successful claim (41%). Reported damages awarded ranged between £2500 and £1,108,825, not including costs. However a significant proportion of the total cost to the NHS appears to be legal fees (see figure). Even in 10 of the cases that failed, the NHS was required to pay legal fees. Only one of the 10 recorded cases of backache alleged to be due to anaesthetic intervention was upheld; the claimant was awarded £5000 damages but the cost to the NHS was £24,600. 39% of cases involving alleged obstetric negligence were successful. Over the same time period, 29 cases involving inadequate anaesthesia during surgery were brought and 22 were upheld. Again legal fees dominated the substantial cost to the NHS. Overall, in 70% of the cases studied the legal fees were greater than the damages awarded.

Discussion: Even where no finding of negligence is made, the cost to the NHS of litigation is extremely high.

Figure. [The case settled for £1000 000 is excluded for ease of illustration]

Reference
1. NHS Litigation Authority. www.nhsla.com
O11 Spinal anaesthesia with levobupivacaine: does it allow fast-tracking?
M Vercauteren, MB Breebaart, HC Coppejans, D Van Doninck
Anaesthesia, Antwerp University Hospital, Edegem, Belgium

Introduction: As in our hospital early initiation of breast feeding is considered to be of extreme importance, we wanted to evaluate whether patients might be discharged from the operating theatre straight to the ward by changing the local anaesthetic used. Levobupivacaine has been shown to have lower motor block potency than racemic bupivacaine.1,2

Methods. After approval by the hospital ethics committee and written informed consent 100 elective caesarean section patients were studied in a randomized double-blind study design. Two groups of patients were compared receiving intrathecally either hyperbaric bupivacaine 6.6 mg (our standard local anaesthetic) or plain levobupivacaine 6.6 mg, as part of a CSE technique in combination with sufentanil 3.3 μg. Immediate discharge to the ward was allowed when patients were able to flex both knees, i.e. Bromage <2. Motor block at incision and after skin closure, the rate of epidural supplementation and hemodynamic and neonatal outcome were compared.

Results. Two patients in the levobupivacaine group were excluded due to technical problems. In the bupivacaine group (n=50) complete motor block was obtained in 68% of patients while at skin closure 56% met the fast-tracking criteria. In the levobupivacaine group (n=48) only 27% had a Bromage-3 block at incision while 73% could be discharged without PACU stay; this was significantly higher (P<0.01) than with bupivacaine. Had unilateral block recovery been sufficient to bypass the PACU, then 72% and 81% of the patients would no longer signify a significant difference. Epidural supplementation was needed in two and three patients respectively (NS). There were no differences in haemodynamic parameters and neonatal outcome was similar.

Conclusions. Low dose spinal anesthesia allows the post-anesthetic care unit to be bypassed by caesarean section patients, enabling fast initiation of breast feeding. The use of levobupivacaine may induce less profound motor block while recovery is faster than with bupivacaine.

References

O12 Randomised controlled trial comparing the effects of oxytocin i.v. bolus vs. oxytocin i.v. infusion on cardiac output during caesarean section
C Molliet, A Senega, C Grassman, PM Barclay
Anaesthesia, Liverpool Women's Hospital, Liverpool, UK

Introduction: Oxytocin is known to cause profound haemodynamic changes.1 The CEMD report recommended a dose of 5 units, given slowly.2 Thomas et al.3 showed that administration over 5 min produced greater cardiovascular stability. Following previous observational work in our unit, we decided to measure the haemodynamic effects of oxytocin using the LiDCOplus system, to examine changes in cardiac output (CO) and systemic vascular resistance (SVR) as well as heart rate and mean arterial pressure (MAP).

Method: Following REC approval and written consent, 36 term patients undergoing elective caesarean section were randomised to receive 5 units of oxytocin either by bolus over 10 s or by infusion over 5 min using a double-blinded method. A radial arterial line was inserted preoperatively and connected to an uncalibrated LiDCOplus monitor. Spinal anaesthesia was performed according to hospital protocol. Haemodynamic changes from baseline were measured for 5 min after oxytocin administration. Uterine tone, estimated blood loss and haemoglobin at 48 h were also recorded.

Results: Bolus administration of oxytocin caused a significantly greater fall in SVR and MAP than infusion, accompanied by a rise in cardiac output and heart rate.

Conclusion: This study confirms the profound haemodynamic consequences of a bolus of oxytocin. Oxytocin should be administered over minutes rather than seconds.

References
O13 A case series of successful videolaryngoscopic intubations in obstetric patients
K Gray, N Lucas, PN Robinson, B Loughnan, H Morris, K Rao, DJA Vaughan
Department of Anaesthesia, Northwick Park Hospital, Harrow, UK

Introduction: We present a case series using videolaryngoscopy (VL) in obstetrics, where parturients have a markedly increased risk of failed intubation. VL has been shown to be superior to conventional laryngoscopy in obtaining a glottic view in routine and in difficult intubation and is used regularly in our hospital. Advantages of VL include a high illumination, high resolution view of the glottis, and an improvement in viewing angle as the line of sight is effectively from near the blade tip. In direct laryngoscopy with a standard Macintosh blade the light source is often suboptimal and the straight line view from the mouth to the glottis may be interrupted by oropharyngeal structures overlapping or displacing the blade.

Methods: Twenty seven patients requiring general anaesthesia for caesarean section had data recorded. The expected and actual ease of intubation were noted (easy, moderate, difficult). Following rapid sequence induction the anaesthetist established a Cormack and Lehane (C+L) laryngoscopic grade using the videolaryngoscope blade in the standard fashion before using the image on the screen to intubate the parturient. The grade on VL was recorded as were any aids used for intubation.

Results: All parturients were intubated successfully with the videolaryngoscope and no patients’ oxygen saturations fell to less than 94%.

Table 1: Glottic view at intubation

<table>
<thead>
<tr>
<th></th>
<th>C+L 1</th>
<th>C+L 2</th>
<th>C+L 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard view</td>
<td>14 (52)</td>
<td>12 (44)</td>
<td>1 (4)</td>
</tr>
<tr>
<td>Videolaryngoscope view</td>
<td>27 (100)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Data are n (%)

No intubations were noted to be difficult. A bougie was used to facilitate intubation in three of the C+L 2 cases.

Discussion: An improved C+L view with VL was clearly evident. In all cases the glottic view was complete (C+L 1) with the videolaryngoscope. Most of these intubations (70%) were by anaesthetists with limited (<20 uses) experience of VL. Previous work has shown that VL is used successfully by anaesthetists with minimal previous experience. We feel VL decreases the risk of failed intubation in the obstetric theatre.

References

O14 Preoxygenation in the obstetric and non-obstetric population: effectiveness of a new technique
R Baraz, RE Collins
Department of Anaesthesia, University Hospital of Wales, Cardiff, UK

Introduction: Preoxygenation to an ETO2 of 0.9 is the gold standard for optimal preoxygenation. Tidal volume breathing for 3-5 min is reliable but time consuming; 4 and 8 deep breaths (DB) are unreliable. Continuous deep breathing has been suggested in the non-pregnant population.2 We investigated if 12 DB improved reliability and some of the factors that may influence this.

Methods: After ethical approval and informed consent, 69 term pregnant and 43 female non-pregnant volunteers (control) ASA 1 & 2 were recruited. After baseline measurements, all were pre-oxygenated with a standard circle breathing system and facemask, a 2-L reservoir bag and oxygen flow of 12 L/min. All lay supine with a 15° left lateral tilt and were asked to take 12 DB and then continue with tidal breaths until ETO2 of 0.9 was achieved. Participants did not practice deep breathing before the study, to mimic the clinical situation. Data from the digital output of Philips Intellivue MP70 monitor and Philips M1026A airway gas analyser were analysed in real time. Statistical analysis was repeated measures ANOVA.

Results: The groups were similar in age and weight. Results are shown in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Pregnant n=69</th>
<th>Control n=43</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ETO2 at 4 DB (SD)*</td>
<td>77.2 (6.5)</td>
<td>77.7 (6.6)</td>
</tr>
<tr>
<td>No. reached ETO2 of 0.9</td>
<td>0/69 (0%)</td>
<td>0/43 (0%)</td>
</tr>
<tr>
<td>Mean ETO2 at 8 DB (SD)*</td>
<td>85.7 (4.2)</td>
<td>85.4 (4)</td>
</tr>
<tr>
<td>No. reached ETO2 of 0.9</td>
<td>18/69 (26%)</td>
<td>5/43 (12%)</td>
</tr>
<tr>
<td>Mean ETO2 at 12 DB (SD)*</td>
<td>89 (3)</td>
<td>88.9 (2.8)</td>
</tr>
<tr>
<td>No. reached ETO2 of 0.9</td>
<td>35/69 (51%)</td>
<td>21/43 (49%)</td>
</tr>
<tr>
<td>RR rate during DB (range)</td>
<td>11.98 (6-21.8)</td>
<td>11.97 (7.5-21.8)</td>
</tr>
<tr>
<td>VT (ml) during DB (range)</td>
<td>1714 (771-3025)</td>
<td>1683 (760-2713)</td>
</tr>
<tr>
<td>Time to ETO2 of 0.9 (range)</td>
<td>74 (34-140)</td>
<td>82 (33-163)</td>
</tr>
</tbody>
</table>

A *P value <0.0001 was achieved within both groups at 4, 8 and 12 deep breaths.

Conclusion: Twelve compared to eight DB improves preoxygenation. Non-pregnant volunteers preoxygenated as effectively as pregnant women by the end of 12 DB. There was a large variation in volumes achieved and rate at which breaths were taken for both groups. This affected the efficiency of the technique. We recommend the use of 12 DB before general anaesthesia for caesarean delivery as this increases the reliability of pre-oxygenation, although monitoring of the ETO2 is recommended because of the large inter-patient variability.

References
O15 Service evaluation of preoxygenation for caesarean section under general anaesthesia
R Porter, D Wrench, R Freeman
Anaesthesia, Royal Hallamshire Hospital, Sheffield, UK
Introduction: In a previous study of preoxygenation in parturients, we reported that air was entrained on 22% of occasions.1 We were concerned that the incidence of this problem may be even higher in the clinical environment. We now report a service evaluation of preoxygenation for caesarean section under general anaesthesia.
Methods: One of the authors (RF) developed software for downloading data from Datex AS3 monitors. This was modified to run continuously as a windows service writing data to a local Microsoft SQL server. Data were collected from the anaesthetic machine in the emergency theatre of the obstetric unit for a three-month period.
Results: We identified 10 patients who had undergone general anaesthesia for emergency caesarean section during the study period. Of these there was evidence of air entrainment with 6 patients on 7 occasions. Three patients had end-tidal oxygen concentrations of <80% before induction of anaesthesia.

Figure: Preoxygenation for caesarean section under general anaesthesia illustrating an episode of entrainment of air (arrow).

Discussion: Pre-oxygenation is an essential part of rapid-sequence induction used to administer general anaesthesia to parturients. This service evaluation indicates that the frequency of poor-quality preoxygenation may be high, indicating a potential risk to patients. This issue could be addressed by increasing training and by guidelines describing adequate pre-oxygenation.

Reference

PI A diagnostic dilemma for postpartum headache
A H Lind, J Joseph, L Khor, E A Thornberry, R Vanner, D Gabbott, C Garcia-Rodriguez
Anaesthetics, Gloucester Royal Hospital, Gloucester, UK
Introduction: Postpartum hypopituitarism is a rare complication of pregnancy usually occurring after significant haemorrhage. We present a case of acute hypopituitarism without significant haemorrhage that was initially treated as post-dural puncture headache.
Case history: 25-year-old primigravida received two lumbar epidurals for labour and ventouse delivery. There was no evidence of dural puncture, and resisting was due to a patch of inadequate analgesia. Estimated blood loss was 500 mL, and recovery was uneventful. Day four postpartum she developed a frontal, postural headache. This was managed conservatively as presumed post-dural puncture headache until day 11 when the headache worsened and she developed visual blurring. No other neurological signs were present. An epidural blood patch was performed with no relief. Neurology review diagnosed low pressure headache and suggested further blood patch. However, due to the severity of the headache we requested a CT scan (patient claustrophobic so MRI not immediately possible), which showed a mass lesion in the suprasellar cistern, suggesting the possibility of pituitary infarction or haemorrhage. A subsequent open MRI showed a presumed adenoma with no evidence haemorrhage or infarction. Blood tests showed pan-hypopituitarism.
Discussion: Anaesthetists are commonly called to see patients with post-partum headache.1 MRI scans demonstrate gradual increase in size of the maternal pituitary during pregnancy,2 but pituitary tumour formation does not increase during pregnancy,3 although there are cases of haemorrhage into pre-existing adenomas in pregnancy. The initial diagnosis after CT was of Sheehan’s syndrome: post-partum pituitary necrosis and hypopituitarism associated with severe haemorrhage during parturition.4 It commonly presents with failure to lactate, amenorrhoea and secondary subfertility. Symptoms of hypothyroidism and hypoadrenalism occur although acute adrenal crises are uncommon. Headache is not usually a predominant feature in Sheehan’s syndrome, and in this case the blood loss was not sufficient to cause it. Two epidurals and a postural headache misled the initial diagnosis with this patient, and CT gave inadequate information, but the case emphasises the need for definitive imaging in cases of uncertain diagnosis or where an epidural blood patch is not successful.

References
P2 An audit of long-term sequelae of post dural puncture headache

A Natarajan, S Biswas, K Gray, DN Lucas, PN Robinson

Anaesthesia, Northwick Park Hospital, Harrow, UK

Introduction: Post dural puncture headache (PDPH) occurs mainly after inadvertent dural puncture and it is commonly believed that the headache is self-limiting and, following conservative treatment, resolution mostly occurs within about 7 days. Anaesthetists assume that complete recovery occurs quickly after this time. However, a literature review states that after conservative treatment recovery occurs quickly after this time. However, a literature review states that after conservative treatment only 75% of PDPH resolve within the first week and 88% will have resolved by 6 weeks. The remaining 12% often have long-term headaches.1

Aim: This audit was undertaken to follow up our patients with PDPH on a long-term basis. The aim was to identify whether our current protocol for these patients is adequate.

Methods: Retrospective data of all patients who developed PDPH over a twenty seven month period were collected from the computerised obstetric audit system. Data from January 2006 - March 2008 were analysed. The patients were followed up by a telephone interview and any patient wishing anaesthetic follow-up was referred to the obstetric anaesthetist clinic. A standardised questionnaire about the features of the headache was completed for each patient contacted. Also the impact on the patient’s lifestyle was noted and if the PDPH was still present the provision of any further care, treatment and follow up was recorded.

Result: A total of 67 patients was identified as having accidental dural puncture from Jan 2006 to Mar 2008. The PDPH rate in the unit was 0.96%. Twenty seven of these patients were diagnosed as PDPH (six of whom underwent epidural blood patch). Of these, 14 were contactable by telephone. Four stated complete resolution of the headache within 10 days, three stated that it took between 8-12 weeks for the headache to resolve and one patient reported that her headache had resolved after 14 months. Six women complained of persistent headache and requested further advice and treatment. These were followed up in the maternity anaesthetic clinic and two were referred for advice and treatment. These were followed up in the maternity anaesthetic assessment clinic and appropriate care for all patients at one- and two-monthly intervals. If the headache remains after this time, it is followed up in the maternity anaesthetic assessment clinic and appropriate management is instigated.

Conclusion: The high incidence of long-term headache in a small cohort of patients suggests that obstetric anaesthetists should have a greater awareness of the possibility that women who suffer PDPH developing long-term sequelae. These may be debilitating. We have altered the protocol for the management of PDPH to include long-term follow-up care for all patients at one- and two-monthly intervals. If the headache remains after this time, it is followed up in the maternity anaesthetic assessment clinic and appropriate management is instigated.

Reference
P4 Are depth to epidural space and the incidence of accidental dural tap related?
N Hollister, D Thorp-Jones, J Coghill
Dept Anaesthetics, Derriford Hospital, Plymouth, UK

Introduction: Accidental dural puncture (ADP) has a quoted incidence of 0.19% to 3.6% of all obstetric lumbar epidurals and is associated with significant maternal morbidity. Previous work from our institution showed a clear increase in depth to epidural space, reflecting an increase in maternal BMI over a nine-year period. We wished to assess if this trend of increasing depth to space increased the risk of ADP.

Method: We performed a retrospective analysis of our local obstetric anaesthetic database, containing 17,997 obstetric lumbar epidurals (analysed over a 15-year period from January 1992 to January 2007). A data sheet is completed per procedure for audit and patient follow-up. ADP was defined as clear evidence of CSF in needle or catheter, spinal anaesthesia following a test dose or symptomatic ADP during follow-up.

Results: Of 17,997 lumbar epidurals performed a total of 111 ADPs were detected giving an overall incidence of 0.62%. There was a clear association between the incidence of ADP and depth to epidural space (fig.1). Regression analysis showed a statistically significant linear relationship between depth and ADP risk. For every 1 cm increase in depth, ADP risk increased, described by an odds ratio of 1.29 (P=0.001; 95% CI 1.10 to 1.50). Mothers with epidural spaces at 10 cm or greater had four times the risk of ADP (2.63%).

Discussion: Increasing depth to epidural space is associated with a significantly increased risk of ADP, with those requiring a long Tuohy needle at greatest risk. We recommend that the potential of increased ADP be clearly identified during pre-assessment and counselling of the morbidly obese parturient. Experienced obstetric anesthetists should be involved in planning and care. Ultrasound imaging of the epidural space may be of use in risk assessment.

References

P5 Carrying out an epidural blood patch: an OAA approved survey of national UK practice
S Eason, J Mørch-Siddall
Anaesthesia, Royal Victoria Infirmary, Newcastle upon Tyne, UK

Introduction: There are no existing guidelines on how to perform an epidural blood patch (EBP) in the UK. We conducted a national survey to benchmark common practice.

Method: An email survey was circulated to all OAA-registered anaesthetic consultants in the UK. An email reminder was sent at six weeks. We enquired whether written consent was taken, when the EBP was done, where, with what monitoring and how long the patient was monitored for. We enquired whether venous access was obtained, where blood was taken from and whether blood cultures were taken. The position of the patient was noted, the level of the EBP, the volume of blood injected and time to mobilisation and discharge.

Results: The survey response rate was 62%. Most EBPs were performed with verbal consent (68%) at around 24 h post puncture in the operating theatre (58%). The lateral position was favoured (57%) and monitoring was used 78% of the time. Venous access was gained in 58% of cases and blood cultures taken in 46%. The EBP was performed relative to the dural puncture: in the same space 34%, space below 33%, space above 16%, any space 10%. The volume of blood injected was "until discomfort" in 38%; <15 mL: 1%; 15-20 mL: 54%; ≥20 mL: 6%. Patients were mobilised at 2-4 h in 55% and after 8 h in 29%; 62% went home within 24 h.

Discussion: Much attention has been given to why, when and whom to patch. Yet despite the optimal timing being put forward as 48 h post-puncture and pre-emptive EBP being rejected there exists a wide variation in practice with the majority being done at 24 h. Ascano et al. put forward a good case for using 30 mL volume or ‘the maximum tolerated’ yet our survey showed the majority of clinicians injecting 15-20 mL. We assumed that all EBP were being done aseptically but in retrospect we would have liked to ask this question directly, also to get more detail about what patients were being asked to consented to. EBP can have serious adverse effects that occur frequently enough to need discussion beforehand.

Conclusion: The performance of EBP is inconsistent and what evidence there is regarding timing and blood volume to be injected is not being followed universally. Scope exists to develop a best practice guidelines for performing EBP.

References
Changing to an 18-gauge Tuohy needle can halve the incidence of severe PDPH

JB Sadashivaiah, G Lyons, R Wilson, H McLure
Obstetric Anaesthesia, St James University Hospital, Leeds, UK

Introduction: Conventionally, a 16-gauge Tuohy needle has been used to locate the epidural space. Puncture with an 18-gauge Tuohy needle should theoretically result in a lower incidence of severe headache, and need for blood patching, because of a smaller dural hole. We reviewed the obstetric anaesthetic practice in our hospital, where 18-gauge Tuohy needles have been in use since 1999.

Methods: The anaesthetic records of 19,447 women who received epidurals between January 1999 and December 2007 at the obstetric unit of St James University Hospital were retrospectively reviewed. An 18-gauge Tuohy needle was used in all cases. We analysed epidurals for labour and also epidurals performed as part of the CSE technique for caesarean section. We specifically looked at the incidence of Tuohy puncture, the consequent development of PDPH and the need for epidural blood patching.

Results:

• The 19,447 epidurals studied included 15,197 labour epidurals and 4,250 CSE epidurals.
• The Tuohy puncture rate was 0.49% (96/19,447); of which 75% were recognised taps and 25% assumed (patients with classical PDPH symptoms but no reported taps).
• Seventy four women (77%) with a Tuohy tap developed PDPH. Of these, 47 (63%) developed severe headache requiring epidural blood patching, giving a patch rate of 49% (47/96) for 18-gauge Tuohy puncture.

Discussion: Our findings match those of Van de Velde et al., who analysed 17,158 epidurals performed using 18-gauge needles. The incidence of Tuohy puncture, PDPH and blood patch in their study was 0.50%, 73% and 59% respectively. The risk of severe headache following a Tuohy puncture with a 16-gauge needle in UK obstetric units is 85% compared with 40% when an 18-gauge needle is used. 80% of women with severe headache request blood patching. Routine use of 18-gauge Tuohy needles for locating the epidural space may halve the incidence of severe PDPH and need for blood patching, and is associated with low rates of inadvertent dural puncture.

References


CT-guided blood patching: an opportunity to reduce risk of additional dural puncture

M Armstrong, J Lermite, H El-Madbouh,* D Jeevarathnam
Dept of Anaesthetics, Peterborough District Hospital, Peterborough, UK

*Dept of Radiology, Peterborough District Hospital, Peterborough, UK

Introduction: We report a case of multiple dural punctures, resulting in severe low intra-cerebral pressure headache treated with CT-guided blood patching.

History: A 32-year-old woman presented for epidural analgesia in her second pregnancy. Her first labour had culminated in a sub-optimally effective sub-arachnoid block to facilitate forceps delivery. She had a history suggestive of chorioamnionitis and agreed to induction of labour at 34 weeks, provided she received good analgesia at an early stage. The first attempt at epidural by an experienced registrar yielded copious cerebro-spinal fluid. The catheter was threaded, which stemmed the visible leak. Incremental doses of bupivacaine failed to establish an adequate block so further siting of an epidural was attempted by the consultant. This yielded further CSF suggestive of further dural puncture and a subsequent bloody tap. All this resulted in a severe postural headache which was combined with strong augmented contractions. Intravenous patient-controlled analgesia was established with inadequate effect. Eventually caesarean section was performed under general anaesthesia. There was initial reluctance to offer blood patching in view of the perceived risk of further dural puncture. However, her symptoms were severe, disabling and unresponsive to conventional conservative measures. CT demonstrated a narrow epidural space and a very thin ligamentum flavum. A needle was inserted just lateral to the midline and the blood bolus injected. Symptoms resolved after 24 h and the patient was discharged.

Discussion: There are reports of the use of CT guidance to treat spontaneous intra-cranial hypotension. Fluoroscopy is used to aid diagnostic lumbar puncture, but CT guidance permits precise identification of the epidural space. We found one report of its use in iatrogenic dural puncture headache after two failed conventional blood patches.

Conclusion: This case prompts consideration of the risk factors for accidental dural puncture. Experience of the operator, although important, may not be the principal cause (neither anaesthetist in this case had had a previous dural puncture in the obstetric population). We suggest that these cases provide a compelling argument for the use of CT-guided blood patching, local expertise permitting, in cases where anatomical idiosyncrasies are felt to have contributed.

References

P8 Difficult intubation in parturients: myth or reality?
B Puic, L Jovanovic, S Milovanovic, A Otic, M Kendrisic
Gynae & Obstet Clinic, Clinical center Vojvodina, Novi Sad, Serbia and Montenegro

Introduction: Anaesthetists' biggest problem is difficult or impossible intubation in parturients while preparing for general anaesthesia (GA) for caesarean section. According to the records, this problem is 7-10 times more common with parturients than with other surgical or gynaecological patients.1

Goal: To determine if there are more patients with difficult intubation among obstetric than among gynaecological patients, and to determine if there is a statistically significant difference between the two groups of patients.

Material and methods: This prospective study was undertaken between January 1st 2008 and December 31st 2008, after ethics committee approval. We monitored the frequency of difficult intubations among gynaecological and caesarean section patients.

Results: There were 1219 gynaecological procedures under GA, and six under spinal anaesthesia (SA). There were 6368 deliveries in 2008, of which 1568 (24.6%) were caesarean sections, 1196 under GA and 372 under regional anaesthesia (RA). Intubation was difficult in 13 gynaecology procedures (1.07%) and 17 obstetric cases (1.42%).

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Obstetrics</th>
<th>Gynaecology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 attempt</td>
<td>6 (35.3%)</td>
<td>2 (15.4%)</td>
</tr>
<tr>
<td>2 attempts</td>
<td>3 (17.6%)</td>
<td>5 (38.5%)</td>
</tr>
<tr>
<td>3 attempts</td>
<td>2 (11.8%)</td>
<td>1 (7.7%)</td>
</tr>
<tr>
<td>&gt; 3 attempts</td>
<td>3 (17.6%)</td>
<td>3 (23%)</td>
</tr>
<tr>
<td>Not intubated</td>
<td>3 (17.6%)</td>
<td>2 (15.4%)</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>13</td>
</tr>
</tbody>
</table>

Conclusion: Our one-year-long study showed no statistically significant difference in the number of difficult intubations between gynaecological and obstetric patients, although literature records show the opposite. If the anaesthetist was well trained to do GA in obstetrics, difficult intubation would be a serious problem, but somehow manageable, provided he was appropriately equipped. On-call duties are still the biggest problem, because only one anaesthetist is present in the hospital.

Reference

P9 Does bed rest vs. immediate mobilisation after epidural blood patch change efficacy?
TL Jones, R Fernando, AJ England
Anaesthetics, Royal Free Hospital, London, UK

Introduction: Evidence that bed rest after epidural blood patch (EBP) improves efficacy is limited to one study.1 Although the local labour ward guidelines recommend 2 h bed rest after EBP, one consultant (AJE) mobilises patients immediately and claims no difference in efficacy. The aim of this audit was to identify if early mobilisation impacted on efficacy of EBP.

Methods: Obstetric patients requiring EBP following accidental dural puncture (ADP) with a 16-gauge Tuohy needle were identified from the computerised audit database (2002-08). Data collection included information on the anaesthetist performing EBP, site of EBP, volume of blood injected and timing of patch after ADP. AJE patients were mobilised immediately, other operators advise 2 h bed rest. The need for further EBP was taken as the marker of efficacy of EBP. Statistical analysis included Fisher's exact test ($P<0.05$).

Results: 34 patients were identified. AJE was the EBP operator in 12 cases (35%), 10 of which (83%) required no further EBP. Of the other 22, 14 (64%) required no further EBP. This difference was not significant ($P=0.4$). Other factors possibly associated with successful first EBP were analysed:

<table>
<thead>
<tr>
<th>Successful 1st EBP</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resited epidural</td>
<td>76%</td>
</tr>
<tr>
<td>Intrathecal catheter</td>
<td>40%</td>
</tr>
<tr>
<td>SVD</td>
<td>67%</td>
</tr>
<tr>
<td>Instrumental del / CS</td>
<td>74%</td>
</tr>
<tr>
<td>EBP &lt;48h of ADP</td>
<td>14%</td>
</tr>
<tr>
<td>&gt;48h after ADP</td>
<td>85%</td>
</tr>
<tr>
<td>&lt;20 mL blood</td>
<td>86%</td>
</tr>
<tr>
<td>≥20 mL blood</td>
<td>68%</td>
</tr>
<tr>
<td>AJE (mobilised)</td>
<td>83%</td>
</tr>
<tr>
<td>Other operator (2 h)</td>
<td>64%</td>
</tr>
</tbody>
</table>

Performing EBP ≥48 h after ADP was associated with greater efficacy ($P<0.001$). There was no significant difference in the timing of EBP after ADP between the AJE patients and the other operators.

Discussion: Our results suggest that immediate mobilisation of patients after EBP is not associated with lower efficacy of the EBP. Indeed the consultant who mobilises his patients immediately post EBP has a higher first EBP efficacy (83% vs 64%), although this was not statistically significant. We calculate that an adequately powered prospective study would require 200 women. Performing EBP within 48 h of ADP is highly predictive of needing repeat EBP and these patients need close follow-up.

Reference
P10 Lipaemic CSF: a case of failed spinal anaesthesia
DG Nicolson, S Kadambande, RE Collis
Department of Anaesthesia, University Hospital of Wales, Cardiff, UK

Case: A 26-year-old woman with Type V hyperlipidaemia had IVF resulting in a twin pregnancy. She discontinued lipid-lowering medication, as their safety in pregnancy is unknown. She was admitted to hospital at 31+2 weeks gestation with threatened preterm labour and her plasma triglycerides were found to be 53.6 mmol/L (normal <2.0), cholesterol 21.2 mmol/L, and blood samples were macroscopically grossly lipaemic. Two days after admission she developed abdominal pain. Pancreatitis secondary to hypertryglyceridaemia was diagnosed with plasma amylase 1021 units/L, Glasgow score of 1, and no signs of gall stones on ultrasound. She was managed as a level-2 patient on the labour ward by a consultant-lead multidisciplinary team. With clinical deterioration over the next 24h (respirations 24-30/min, pulse 130/min, CRP 162) and a worsening metabolic acidosis (pH 7.38, HCO$_3^-$ 18 mmol/L, CO$_2$ 3.5 kPa, BE -8.5 mEq/L), it was decided to perform a caesarean section. Spinal anaesthesia was carried out with a 25-gauge Sprotte needle at the L3-4 interspace at first pass. CSF was aspirated both before and after a 2.4-mL injection of 0.5% heavy bupivacaine, fentanyl 20 μg and morphine 100 μg. There was adequate spread of the block (T4-S1 to cold) but poor block density (no motor block and the patient still felt pain over the lower abdomen.) A second spinal anaesthetic was performed at the same space again after one pass. After closer inspection, turbid CSF was noted both before and after injection of 0.5% heavy bupivacaine 1.5 mL, fentanyl 10 μg and morphine 10 μg. With no improvement in block density, surgery was continued under general anaesthesia. Ascitic and amniotic fluid were both grossly lipaemic in appearance. Two live babies were delivered, the patient was extubated on completion of surgery and transferred to level-2 care on general ICU. Lipid lowering medication was restarted, her pancreatitis settled and she was discharged home 9 days later with triglycerides of 9.8 mmol/L and cholesterol of 7.4 mmol/L.

Discussion: With triglyceride levels >10 mmol/L, there is a risk of pancreatitis, which may have a 20% mortality in pregnancy. This patient appeared to have lipaemic fluid in all fluid compartments including her CSF. CSF normally has a triglyceride concentration of 0.1–0.2% of plasma concentration. A proposed mechanism of action for lipid emulsion, now being used to treat local anaesthetic toxicity, is by binding to the local anesthetic. We hypothesize that triglycerides in the CSF bound to the bupivacaine, preventing adequate anaesthesia for caesarean section.

References

P11 More tapping at night? A review of nocturnal risk of accidental dural puncture in epidural analgesia for labour
N Hollister, D Thorp-Jones, J Coghill
Department of Anaesthesia, Derriford Hospital, Plymouth, UK

Introduction: Accidental dural puncture (ADP) has a quoted incidence of 0.19% to 3.6% of all obstetric lumbar epidurals and is associated with significant maternal morbidity. The risk of ADP is considered to increase at night. Nocturnal anaesthetic practice changed in light of the CEPOD report of 2001. To improve consent and patient safety issues we felt it important to address the supposed increased risk of ADP in night-time obstetric anaesthesia.

Methods: Data were gathered from a database of 17 997 epidurals performed over a 15-year period. Epidurals were performed in labouring women on the central delivery suite by the on-call anaesthetist using a 16-gauge Tuohy needle and catheter (Portex Minipack Smiths Medical ASD USA). For statistical analysis the 24-h period was divided into three groups: midnight to 07:59, 08:00 to 17:59 and 18:00 to 23:59. Microsoft SPSS and χ² tests were used to analyse the data.

Results: Of 17 997 epidurals, complete data were available in 17 966 cases with 111 cases of ADP giving an incidence of 0.62%. We found the risk of ADP to be very similar irrespective of time of procedure with no statistically significant difference between the groups. (P= 0.932 and likelihood ratio 0.931).

<table>
<thead>
<tr>
<th>Time group</th>
<th>No ADP</th>
<th>ADP</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midnight-07:59</td>
<td>4580</td>
<td>27</td>
<td>4607</td>
<td>0.59</td>
</tr>
<tr>
<td>08:00-17:59</td>
<td>9511</td>
<td>61</td>
<td>9572</td>
<td>0.64</td>
</tr>
<tr>
<td>18:00-23:59</td>
<td>3764</td>
<td>23</td>
<td>3787</td>
<td>0.61</td>
</tr>
<tr>
<td>Total</td>
<td>17855</td>
<td>111</td>
<td>17966</td>
<td></td>
</tr>
</tbody>
</table>

Discussion: There is no increased risk of ADP at night and therefore no evidence to change practice for nocturnal obstetric epidural analgesia at our institution.

References
P12 The CUSUM method to detect abnormal rates of unintentional dural puncture

MJ MacKenzie, BJ Norman
Magill Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK

Introduction: The rate of unintentional dural puncture is likely to be inversely related to operator experience, thus rates across the UK may vary between 0.19% and 3.6%.1 A rate of over 1% should be considered a cause for concern when early in the learning process.2 Cumulative sum (CUSUM) graphs are a method of statistical process control that can be used in healthcare to show achievement of procedural competency. It is also a tool for detecting abnormal surgical mortality rates. We describe its use to determine when rates of dural puncture become unacceptable and to highlight a need for further training or supervision.

Methods: We used the statistical method described by Davies3 to create a boundary-line graph for an acceptable (P0) of 1%, and an unacceptable rate (P1) of 2%. Assuming a and B errors of 0.05 we can give 95% confidence intervals of accepting either P0 or P1 as the actual rate. The upper boundary has the equation X=Y−d/(P+Q) and the lower boundary has X=cY+d/(P+Q), where: 
\[
c = Q/(P+Q), \quad P = \ln(p_0/p_1), \quad Q = \ln((1-p_0)/(1-p_1)) \quad \text{and} \quad d = \ln(1-B)/a
\]
when a = B.

Discussion: If two dural taps occur before 38 epidurals or three before 107, the upper boundary line is met and the anaesthetist can be 95% sure that their actual rate is 2% rather than 1%, indicating a need for further training. The CUSUM method is not intended for rapidly changing rates and once the lower boundary line is met (indicating 95% confidence that the actual rate is 1% rather than 2%), a new graph should be constructed with lower values for P0 and P1. The same technique could also be used by departments to ensure quality control.

References

P13 What mothers know, and want to know, about the complications of general anaesthesia

GNB Jackson, SM Yentis, M Woolnough, K Gough,* A Natarajan,* DN Lucas,* PN Robinson,* Magill Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK, *Department of Anaesthesia, Northwick Park Hospital, London, UK

Introduction: Informed consent for emergency caesarean section requires women to understand at least some of the risks of general anaesthesia (GA). Previous work suggests that differences exist between hospitals’ local populations regarding the required level of regional anaesthetic risk disclosed.1 We assessed mothers’ awareness of GA risks and how much they wanted to know, in two different hospitals.

Method: After ethical approval and informed consent, 150 women (100 from C+W, 50 from NPH) who had normal vaginal deliveries were questioned on the first postnatal day about their knowledge of GA risks, and the levels of risk at which they thought knowledge was necessary to make an informed decision. Data were compared with χ² and Fisher’s exact tests, P<0.05 denoting statistical significance.

Results: Knowledge of risks and required levels of risk information are shown in the Table. *P<0.005

<table>
<thead>
<tr>
<th>Risk</th>
<th>C+W (n = 100)</th>
<th>NPH (n = 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficult intubation</td>
<td>24</td>
<td>11 (22%)</td>
</tr>
<tr>
<td>Aspiration</td>
<td>32</td>
<td>11 (22%)</td>
</tr>
<tr>
<td>Awareness</td>
<td>75</td>
<td>25 (50%)*</td>
</tr>
<tr>
<td>Damage to teeth</td>
<td>20</td>
<td>8 (16%)</td>
</tr>
<tr>
<td>Allergy</td>
<td>83</td>
<td>28 (56%)*</td>
</tr>
<tr>
<td>Malignant hyperpyrexia</td>
<td>8</td>
<td>7 (14%)</td>
</tr>
<tr>
<td>Scoline apnoea</td>
<td>22</td>
<td>5 (10%)</td>
</tr>
<tr>
<td>PONV</td>
<td>85</td>
<td>39 (78%)</td>
</tr>
<tr>
<td>Chosen level of risk:**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:1 — 1:1000</td>
<td>54</td>
<td>25 (50%)</td>
</tr>
<tr>
<td>1:1000 – 1:1,000,000</td>
<td>26</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>&lt; 1:1,000,000</td>
<td>19</td>
<td>9 (18%)</td>
</tr>
<tr>
<td>Unable to answer</td>
<td>1</td>
<td>2 (4%)</td>
</tr>
<tr>
<td>Desire for information:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All risks</td>
<td>31</td>
<td>12 (24%)</td>
</tr>
<tr>
<td>Most risks</td>
<td>32</td>
<td>12 (24%)</td>
</tr>
<tr>
<td>Some risks</td>
<td>34</td>
<td>26 (52%)</td>
</tr>
<tr>
<td>No risks</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

**above which the women felt they should be informed

Discussion: Women vary in their background knowledge of GA risks and this may also differ between units. Women in both units showed considerable variation in their wish for information, supporting a flexible approach when offering risk information to them.1

Reference
P14 A retrospective audit of early warning scores in the detection of critically ill obstetric patients

SR Tufail, EM Flavell, RE Collis
Anaesthetic Department, University Hospital of Wales, Cardiff, UK

Introduction: Early warning scores (EWS) are in widespread use for non-obstetric patients, but their use for obstetric patients has been limited. The CEMACH report identified EWS as a potentially useful tool for the early detection of critical illness in obstetric patients. In our obstetric unit various documentation existed with no standardised chart in use. The aim of this audit was to review cases that had an adverse outcome, to identify if an EWS might have altered patient care.

Method: Potential cases were identified through local clinical risk meetings (Dec 2006-Jan 2008) where a poor outcome and substandard care were considered contributory. Patient observations obtained from the notes and a variety of charts were transferred to the obstetric early warning chart from the CEMACH website. Two yellow or one red score constituted a trigger. The timing of red flags was noted and compared with first senior review, first recognition of the sick mother and time of a definitive plan.

Results: Nine cases where the notes were available and complete were reviewed. All required critical care admission.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Clinical risk</th>
<th>Time to trigger (min)</th>
<th>Time to senior review (min)</th>
<th>Time to definitive action (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PPH</td>
<td>0</td>
<td>600</td>
<td>180</td>
</tr>
<tr>
<td>2</td>
<td>PPH</td>
<td>0</td>
<td>10</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>PPH</td>
<td>0</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>PPH</td>
<td>N/A</td>
<td>57</td>
<td>155</td>
</tr>
<tr>
<td>5</td>
<td>PET/Sepsis</td>
<td>240</td>
<td>600</td>
<td>1070</td>
</tr>
<tr>
<td>6</td>
<td>Renal failure</td>
<td>120</td>
<td>1470</td>
<td>3990</td>
</tr>
<tr>
<td>7</td>
<td>Haematoma</td>
<td>1440</td>
<td>2650</td>
<td>11370</td>
</tr>
<tr>
<td>8</td>
<td>IUD/Abruption</td>
<td>0</td>
<td>85</td>
<td>153</td>
</tr>
<tr>
<td>9</td>
<td>HELLP</td>
<td>0</td>
<td>3360</td>
<td>4380</td>
</tr>
</tbody>
</table>

Mean 225  1005  2387.4
Range 0-1440 0-3360 90-11370

Discussion: Most cases had an early trigger, which continued throughout their illness. The majority relied on cardiovascular variables for detection, which are routinely recorded in labour. Time delays occurred throughout the time-line from initial triggering, medical review, senior review and definitive management. This ranged from minutes to days in some cases and significant illness was apparently unrecognised despite senior medical review and persistent red triggers in some cases. Documentation on a universal chart might have improved clarity and this audit indicates that EWS could aid the recognition of acute illness in the parturient.

Reference


P15 A retrospective review of obstetric admissions to a tertiary referral liver intensive care unit

HJ Kaye, VA Skelton, GDL Allan
Anaesthesia, King’s College Hospital, London, UK

Introduction: Liver disease in pregnancy is rare and has a potentially high mortality unless diagnosed and treated promptly. Preeclampsia is a multisystem disease and encompasses haemolysis, elevated liver enzymes and low platelets (HELLP) and acute fatty liver of pregnancy (AFLP). Acute fatty liver of pregnancy is estimated to occur in 1:10 000 pregnancies.1 Liver haematoma and rupture are rare but devastating complications of pregnancy and associated with preeclampsia, 1:45000 to 1:250000 deliveries.2

Methods: All obstetric patients admitted to a tertiary referral liver intensive care unit (LITU) were reviewed between the 21/12/1999 and 02/10/2006. Information was retrieved from the liver database and patient records.

Results: There were 50 admissions; 38 patients were delivered by caesarean section, nine spontaneous vaginal births, and three instrumental deliveries. Patient age range was 15-40 years. Clinical diagnoses see table:

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No. patients</th>
<th>No. deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>HELLP</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>AFLP</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>AFLP/pancreatitis</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>HELP/AFLP</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Small vessel veno-occlusive disease</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Acute liver failure/preeclampsia</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Pregnancy rel liver dysfunction</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>AFLP/ruptured liver</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>HELP/ liver haematoma</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Liver haematoma</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ruptured liver</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>AFLP/retroviral therapy</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>HIV/Sepsis/acute liver failure</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Liver metastasis</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

The average length of stay in LITU was 8.2 days, 52% of patients staying less than 5 days. One patient admitted with HELLP/preeclamptic liver disease required liver transplant and survived. One patient admitted with preeclamptic liver disease received two liver transplants but died.

Conclusions: Patients transferred for specialist intensive care management mostly survive with supportive management. From this series patients who were HIV-positive with obstetric-related liver disease had a poor prognosis. Patients who developed liver haematomas or ruptured liver had a 29% mortality rate.

References

P16 A survey of obstetricians' knowledge of aspects of acute care in maternity HDU patients

N Sabir, DJA Vaughan, DN Lucas, I Chan, S Bhuptani, PN Robinson
Anaesthesia, Northwick Park Hospital, Harrow, UK

Introduction: The postgraduate training of doctors has undergone significant changes in the last few years. Trainee doctors (in the labour ward setting obstetricians) provide most of the initial assessment and management of acutely ill patients. It has previously been shown that there are significant deficiencies in the knowledge of trainee doctors regarding aspects of acute care.1 We were interested in investigating this issue on the context of obstetrics.

Method: We asked obstetricians of all grades to complete a questionnaire about aspects of acute care particularly related to the obstetric patient. The participants were encouraged to complete the questionnaire at the time of distribution without reference to colleagues, textbooks or the internet. The questions centred on key parts of cardiovascular and respiratory assessment of the acutely ill parturient and questions specific to the labour ward setting.

Results: Forty-one obstetricians completed the questionnaire. A selection of questions and responses are presented below.

<table>
<thead>
<tr>
<th>Question</th>
<th>No (%) answering correctly</th>
<th>No (%) answering incorrectly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum hourly urine output</td>
<td>18 (44)</td>
<td>23 (46)</td>
</tr>
<tr>
<td>Normal PaO₂</td>
<td>19 (46)</td>
<td>22 (54)</td>
</tr>
<tr>
<td>Safe lower limit SpO₂</td>
<td>21 (51)</td>
<td>20 (49)</td>
</tr>
<tr>
<td>Four causes of convulsions on labour ward &amp; management</td>
<td>30 (73)</td>
<td>11 (27)</td>
</tr>
<tr>
<td>Circulating volume of adult</td>
<td>19 (46)</td>
<td>22 (54)</td>
</tr>
</tbody>
</table>

Conclusion: The knowledge of obstetricians about their own speciality was good. However this was not the pattern with questions outside their immediate area of expertise. With the advent of MMC there is less opportunity for doctors to gain experience outside their chosen specialty. Conversely in obstetrics there are increasing numbers of parturients with medical co-morbidity coupled with the need to expand obstetric high dependency units. Obstetricians may therefore be asked to provide care for the acutely ill obstetric patient. There is good evidence that attendance on courses such as ALERT™ has a positive impact on a health care professional’s knowledge and confidence when dealing with medical emergencies. 2 We believe that in the era of ‘run through’ training the importance of these courses increases and attendance should become mandatory.

References

P17 A three-year survey of obstetric critical care admissions in a tertiary centre

N M Girish Sadhu, R Wadsworth, R Samangaya
Anaesthetics, St Mary's Hospital, Manchester, UK

Introduction: In the UK there is a great demand for critical care unit (CCU) beds, which are expensive and limited in number. Admission to CCU in the immediate postpartum period separates the mother and baby and could potentially affect bonding. Our objectives were to observe trends in obstetric CCU admissions over a three-year period, review clinical characteristics and outcome of critically ill obstetric patients, identify causes for any change in trends and assess APACHE II predictability.

Method: The CCU database was used to study all women who had been admitted to CCU at St Mary’s Hospital at more than 20 weeks gestation between January 2005 and December 2007. A proforma was completed from the notes.

Results: There were 57 admissions in total to CCU (3.86 per 1000 deliveries), 40 to the intensive care unit (ICU) and 17 to the high dependency unit (HDU).

Admission to CCU in the immediate postpartum period, review clinical characteristics and outcome of critically ill obstetric patients, identify causes for any change in trends and assess APACHE II predictability.

Major post-partum haemorrhage (PPH) was the most common cause for CCU admission. 90% of the women admitted to CCU had interventional deliveries.

Mean duration of stay in ICU was 42 h and HDU 39 h. APACHE II-predicted mortality for three years was 6.4 but the actual mortality for 3 years was one.

<table>
<thead>
<tr>
<th>Year</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total deliveries</td>
<td>4683</td>
<td>5033</td>
<td>5034</td>
</tr>
<tr>
<td>Admissions to CCU</td>
<td>12</td>
<td>19</td>
<td>26</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>26</td>
<td>28</td>
<td>32</td>
</tr>
<tr>
<td>Most common cause</td>
<td>Respiratory</td>
<td>Cardiac</td>
<td>PPH</td>
</tr>
<tr>
<td>Number of PPH</td>
<td>1</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Total CCU stay (days)</td>
<td>11.8</td>
<td>33.6</td>
<td>82.9</td>
</tr>
</tbody>
</table>

Discussion: There is a definite increase in number of admissions and use of critical care resources. PPH is the most common cause and is showing an increasing trend consistent with other recent studies.1,2 The probable causes for this are increase in maternal age, increase in pre-existing co-morbidities and increase in interventional deliveries similar to the recent CEMACH report. APACHE II over-predicts mortality in the obstetric population.

References
P18 Survey of high dependency care on delivery suite: anaesthetists' roles and views

Introduction: Although staff involved in care of sick parturients should be appropriately trained, a recent survey suggested that midwives did not feel confident to perform a variety of critical care skills.1 We wished to discover what involvement anaesthetists have in teaching/training and their expectations of midwives in recovery/high dependency care.

Method: An OAA approved postal questionnaire was sent to the lead obstetric anaesthetist in 221 units in the UK, in June 2008.

Results: The response rate was 85%, (188/221); 3 rural units that had delivery rates of <250/ year were excluded; 75% responders worked in DGHs. 62%, (115/188) of units conducted >3000 deliveries/year. 53%, (98/185) of units had high dependency care beds on the delivery suite. Of those that did, 70% had a maximum of 2 beds. 2/3 of units reported that they did not have 24-h cover by appropriately trained midwives. In those units that provided in-house training for midwives (45), <50% had anaesthetic input into the program; 50% units reported using Modified Early Obstetric Warning Scoring system (MEOWS). Table 1 shows the lead clinician’s assessment of the competency of midwives in various skills.

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>Competent (%)</th>
<th>Not competent (%)</th>
<th>Not completed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery after GA</td>
<td>51</td>
<td>38</td>
<td>11</td>
</tr>
<tr>
<td>Ventimask set-up</td>
<td>59</td>
<td>28</td>
<td>12</td>
</tr>
<tr>
<td>Use of Ambu bag</td>
<td>66</td>
<td>25</td>
<td>9</td>
</tr>
<tr>
<td>Use of Pain/Sedation chart</td>
<td>85</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Use of Glucometer</td>
<td>92</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Use of Haemacue</td>
<td>35</td>
<td>56</td>
<td>10</td>
</tr>
<tr>
<td>Central line set-up</td>
<td>12</td>
<td>77</td>
<td>11</td>
</tr>
<tr>
<td>Arterial line set-up</td>
<td>12</td>
<td>77</td>
<td>11</td>
</tr>
<tr>
<td>Use of CPAP/Ventilator</td>
<td>1</td>
<td>87</td>
<td>12</td>
</tr>
</tbody>
</table>

Conclusions: Although invasive monitoring is rarely needed in obstetric patients, it is notable that anaesthetists consider the staff inadequately trained. Any consultant-led unit should be able to provide care for patients receiving general anaesthesia, and the fact that lead clinicians only felt their staff were competent to recover such patients in half the units, is a serious risk management issue. Despite the recommendations of the last two triennial CEMACH reports, the use of MEOWS is still rare in obstetric units.

References

P19 Validity of a postoperative quality of recovery score after caesarean section: the FS-15
A Bright, T Tan, L Briggs
Department of Perioperative Medicine, Coombe Women and Infants University Hospital, Dublin, Ireland

Introduction: A mother’s readiness to assume infant-care responsibilities1 and self-care activities, in the early postoperative period after caesarean section is a valid and important outcome.2 We attempted to develop a valid measure of quality of recovery after caesarean section based on the SF-363 and Barthel's index.4

Methods: We interviewed 40 patients after caesarean section on postoperative days 1, 2 and 3 using a 15-item questionnaire (FS-15; maximum score 33, minimum score 11). The FS-15 consists of a multidimensional construct that includes physical functional status, ability to nurse the new-born, pain, vitality, and mental health. Patients were also asked to rate their recovery on a 10-cm visual analogue scale (VAS), and their overall satisfaction on the respective days.

Results: There was a negative correlation between the FS-15 and VAS on postoperative days 2 (Spearman r = -0.5, P=0.001) and 3 (Spearman r = -0.35, P=0.03). We also found a positive correlation between the FS-15 and satisfaction scores (Spearman r = 0.44, P = 0.04) and a negative correlation with opioid use (Spearman r = -0.39, P = 0.039). There was a significant increase in the FS-15 over the three postoperative days (analysis of variance, Kruskal Wallis test; P < 0.001) representing an improvement in the FS-15 over time.

Discussion: We believe that the FS-15 can be used to measure quality of recovery after caesarean section and would be a useful measure of outcome in audits and clinical studies.

References
Epidural catheter migration has been shown to be related to the length of time the catheter is left in situ. We performed a prospective study of epidural catheter migration in relation to length of time catheter in situ and body mass index (BMI) of the parturient.

**Introduction:** Epidural catheter migration migration has been suggested as a cause of failure of analgesia as well as inadvertent intrathecal or intravenous administration of local anaesthetic. Migration has been shown to be related to the length of time the catheter is left in situ. We performed a prospective study of epidural catheter migration in relation to length of time catheter in situ and body mass index (BMI) of the parturient.

**Methods:** The epidural records from 50 consecutive parturients receiving epidural analgesia for labour were reviewed. A standardised insertion technique using a 16-gauge Tuohy needle and catheter (Portex Minipack Smiths Medical ASD USA) and catheter fixation method were used in all cases. The catheter length at the skin at insertion and removal were noted. Patient’s height, weight, time of insertion and removal along with adequacy of analgesia were recorded. Results were analysed using multiple regression analysis with a model of absolute movement (F2,49=4.67, P=0.014) to demonstrate any effect of time or BMI on catheter migration.

**Results:** 28% of catheters migrated inwards while 40% migrated outwards, the extent and direction of which can be seen in the figure below. There was no correlation of epidural catheter migration with time (=0.409, P=0.68). Four catheters migrated outwards by over 5 cm of which three resulted in analgesic failure. There was significant positive correlation of epidural catheter migration with increasing BMI (=3.039 P=0.04).

**Discussion:** Contrary to previous reports, our study shows that epidural migration is unrelated to the length of time the catheter is left in situ. However, we have shown catheter migration with increasing BMI. Therefore additional catheter advancement at time of insertion may be useful in parturients with a greater BMI to ensure adequate analgesia.

**Acknowledgement:** Dr P Finch for statistical analysis.

**References**

P22 Analgesia for labour at the Royal Free Hospital: a patient perspective

C Moss, R Simons
Anaesthesia Dept, Royal Free Hospital, London, UK

Background: Analgesia is a basic human right, and it has been shown that dissatisfaction with labour analgesia results in increased duration of labour and likelihood of instrumental delivery. The Royal College of Anaesthetists’ target satisfaction rate is >90% for those receiving non-regional analgesia and >95% for those receiving regional analgesia. We were keen to learn our patients’ views on various aspects of pain management for labour.

Methods: Questionnaires were sent to 300 women who had laboured at our hospital. Questions explored patient demographics, knowledge and experience during labour.

Results: Demographics: 112 replied (37% response rate); 74 stated English was their first language; 61 were first-time labourers.

Information prior to delivery: 86% felt well informed. The majority used more than one resource to improve their knowledge; 58% cited antenatal classes as their main source, at which information was similarly and broadly covered; 79% felt they understood the information well; 27% did not attend antenatal classes; half of these did not have English as their first language. 56% said they would have liked to have had the opportunity to meet an anaesthetist before labour.

Analgesia offered and used: 44% of respondents felt they had to ask for analgesia to ‘some’ or ‘great’ extent. Entonox was the most popular, being offered in 70% of cases and used in 59%. Many used more than one technique including epidurals (second most common), pethidine, TENS and ‘alternative’ methods; 13% used no analgesia at all.

Epidurals: 39% had epidurals. Epidural use was higher in primips, where English was not the first language, and in those who had not attended antenatal classes. Women stated that epidurals were explained well by the anaesthetist. There were 12 respondents who did not receive an epidural when they had wanted one.

Patient satisfaction: overall there was a 77% satisfaction rate. Satisfaction rate was higher for those having epidurals (91%) and lower for those not having epidurals (67%).

Discussion: The study gave us insight into the patients’ perspective of their experience. Our hospital fell short of the satisfaction targets and changes to improve this are underway in our obstetric unit. These include new guidelines for labour ward and working towards the opportunity for women to learn more about anaesthetic services in the antenatal period. Once these changes are established we will reassess our satisfaction rates.

References
1. International Association for the Study of Pain http://www.iasp-pain.org/AM/Template.cfm?Section=Home&CONTENTID=2260&TEMPLATE=/CM/ContentDisplay.cfm

P23 Change from continuous infusion to patient-controlled epidural analgesia (PCEA) in a tertiary obstetric unit: impact on obstetric outcomes

KL Konrad, MJL Scrutton
Anaesthesia, St Michael’s Hospital, Bristol, UK

Introduction: NICE intrapartum guidelines recommend the use of either intermittent bolus or PCEA rather than continuous infusions for epidural analgesia in labour. Although there is some evidence that PCEA reduces the total dose of bupivacaine used and may improve maternal satisfaction, there remains debate about the effects on labour and delivery. This is further confused by the differing PCEA regimens reported: with or without background infusions. We report the impact of the introduction of PCEA in our unit.

Methods: The study period covered 12 months. In the first 6 months (pre-PCEA), all epidurals were maintained by continuous infusion of 0.1% bupivacaine with fentanyl 2 µg/mL (6-12 mL/h). In the second 6 months (post-PCEA) all epidurals were maintained with PCEA using the same solution (8-mL bolus, 15-min lockout, no background infusion). Throughout the 12 months, epidural analgesia was ‘loaded’ at the discretion of the anaesthetist using either epidural (90%): bupivacaine 15-30 mg + fentanyl 20-50 µg or spinal (10%): bupivacaine 2.5 mg + fentanyl 5-25 µg). Data on epidural usage and labour outcomes were collected from the STORK maternity database.

Results: In the pre-PCEA and post-PCEA periods there were 2619 (47% nullips) and 2645 (48% nullips) confinements. The epidural rates were similar: 36% in nullips and 10% in multiparae pre-PCEA and 38% in nullips and 11% in multiparae post-PCEA. Overall (all confinements), mode of delivery was similar pre- vs. post-PCEA: spontaneous vertex 62% vs 63%, forceps 7% vs. 8%, ventouse 7% vs. 5% and emergency CS 12% vs. 11% respectively. In the women having epidural analgesia for labour, modes of delivery are described in Table 1.

Table 1: Labour outcomes (all results NS)

<table>
<thead>
<tr>
<th></th>
<th>Pre-PCEA (nullips/multipa)</th>
<th>Post-PCEA (nullips/multipa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVD</td>
<td>33% / 60%</td>
<td>33% / 57%</td>
</tr>
<tr>
<td>Ventouse</td>
<td>18% / 16%</td>
<td>14% / 6%</td>
</tr>
<tr>
<td>Forceps</td>
<td>25% / 11%</td>
<td>30% / 8%</td>
</tr>
<tr>
<td>Emergency caesarean</td>
<td>24% / 14%</td>
<td>23% / 19%</td>
</tr>
</tbody>
</table>

Conclusion: The introduction of PCEA in our unit has not altered the modes of delivery in women having epidural analgesia. However, PCEA has resulted in a reduction of midwifery workload and has been welcomed by midwives, mothers and anaesthetists.

References
P24 Does previous back surgery affect the success of obstetric regional anaesthesia and analgesia? A retrospective audit of 10 years experience in a district general hospital
SS O'Neill, H Edgcombe, R Jones, Royal Berkshire Hospital, Reading, UK

**Introduction:** Women who have had back surgery can present a significant challenge to the obstetric anaesthetist. Potential difficulties with neuraxial techniques include scarring and adhesions in the tissues of the back, difficulty identifying landmarks and disruption of the epidural space. This can lead to technical difficulties in placing neuraxial blocks and patchy or no analgesia. Our practice has been to inform these women that they are likely to experience a higher rate of technical difficulties and a lower success rate with neuraxial techniques, but we have had little data to back this up.

**Methods:** We searched our obstetric anaesthesia database for women with previous spinal surgery seen over a ten-year period from May 1998 to May 2008. We then reviewed these notes.

**Results:** We identified 142 pregnancies in 119 women. No delivery information was found for four of them. Most fell into the broad categories of disc surgery or rod implantation. Others included surgery for ankylosing spondylitis, spina bifida and various traumatic injuries. There were 78 deliveries in women who had previously undergone discectomy or laminectomy. Regional anaesthetic techniques performed in these cases were: 23 labour epidurals, 5 combined spinal–epidurals for elective caesarean section, and 24 spinals (for both elective caesareans and various emergency procedures). In most of these cases the regional blocks were straightforward to site and had good effect. Two epidurals had to be reinserted but then worked well, one was inadequate for caesarean section and was replaced with a spinal, and in one case the epidural space could not be identified. There were 40 deliveries in women who had undergone implantation of rods, 31 for surgical correction of scoliosis, and the remainder following trauma or tumour removal. Regional techniques performed in these cases were 5 labour epidurals and 9 spinals. The spinals were generally straightforward but the epidurals were all described as difficult. Only two provided good analgesia, one was patchy and two failed completely. Five women used remifentanil PCA in labour. There were ten general anaesthetics in this group, five for elective and five for emergency caesarean section.

**Conclusion:** From our data it seems that women with previous disc surgery can be offered neuraxial anaesthetic techniques for labour and delivery with confidence. However in patients with previous rod implantation, our success rate for regional blocks, particularly epidurals, was low. This enables us to give much more specific advice antenatally to women with previous spinal surgery.

**Reference**

P25 How hard do you work? An analysis of anaesthetic interventions during three different epidural maintenance techniques for labour analgesia
G Peters, R Snaith,* A Harvey,* S Martin,† E McGrady,*
†Anaesthesia, Queen Mothers Hospital, Glasgow, UK,
Anaesthesia, Queen Mothers Hospital and Ayshire Maternity Hosp, Kilmarnock, UK, *Anaesthesia, Princess Royal Maternity Hospital, Glasgow, UK

**Introduction:** Workforce planning is important in anaesthesia. Number of anaesthetic interventions (AI) is a recognised measure of obstetric anaesthetic activity. There are no published data comparing AI when different maintenance techniques are used for epidural analgesia during labour (EAL).

**Aim:** To determine if AI differs between patient-controlled epidural analgesia (PCEA), continuous epidural infusion (CEI) and intermittent midwife top-up (MWT) when used for maintenance of EAL.

**Method:** Data were collected prospectively in three maternity units, each using a different maintenance technique. The PCEA group could administer a 10-mL bolus of 0.1% bupivacaine with fentanyl 2 μg/mL, 30-min lockout and no background infusion. The CEI group had 8-12 mL/h of 0.1% bupivacaine with fentanyl 2 μg/mL, with an option of two midwife top-ups before anaesthetic intervention. The MWT group had a 10-mL bolus of 0.1% bupivacaine with fentanyl 2 μg/mL every 45-60 min. All anaesthetic attendance is included except initial epidural insertion and intervention at the time of delivery. Duration of EAL was also recorded.

**Results:** Maternal age, parity and SVD rate were similar across all groups.

<table>
<thead>
<tr>
<th></th>
<th>PCEA (n = 75)</th>
<th>MWT (n = 47)</th>
<th>Infusion (n = 74)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration EAL</td>
<td>389.1 ±208.6</td>
<td>274 ±141.7</td>
<td>175 ±118.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>mean ±SD (min)</td>
<td>3.4</td>
<td>(3.4)</td>
<td>(4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>AI/h</td>
<td>0.03</td>
<td>0.15</td>
<td>0.33</td>
<td></td>
</tr>
</tbody>
</table>

66/68 interventions (97%) across all groups were for inadequate analgesia. One was for hypotension and one for catheter dressing dislodgement, both in the MWT group. Patients using PCEA require significantly less AI than those in both other groups. This is further emphasised with a 5-fold reduction in AI/h compared to the MWT group and a 10-fold reduction in AI/h compared to the infusion group.

**Discussion:** Results suggest that one necessary consideration when planning anaesthetic workforce in the labour suite is EAL maintenance technique.

**Reference**
P26 In-vitro spread of epidural infusion regimes: infusion vs PCEA bolus vs manual injection
MJ Gray, S Dinesh
Department of Anaesthesia and Intensive Care, Heart of England NHS Foundation Trust, Birmingham, UK

Introduction: Rescue top-ups may be required during epidural infusions. Their flow and spread in-vitro has been demonstrated.1,2 We assessed in-vitro flow patterns, diffusion of dye and injection pressures to compare pump-delivered PCEA boluses against manual syringe boluses and continuous infusion.

Method: A 16-gauge multi-hole epidural catheter was fixed above semi-absorbent paper and connected to a pressure transducer. Three injection modalities were assessed: infusion at 10 mL/h, patient-controlled epidural analgesia (PCEA) bolus, manual syringe injection, with 5-mL injection of methylene blue in saline. Flow patterns from the catheter orifices were recorded, and spread of dye on semi-absorbent paper observed over a 30-minute period. The pressures generated for each injection modality were recorded via the pressure transducer connected to standard monitoring facilities.

Results: The 10-mL/h infusion generated a pressure of 34 mmHg with flow entirely through the proximal orifice. The 5-mL PCEA bolus delivered over 90 s generated a pressure of 250 mmHg, with flow from the proximal and middle orifices. The manual bolus generated a pressure in excess of the transducers range (>320 mmHg), and vigorous flow was seen from all orifices. The spread of dye is demonstrated in the image below, and shows the slow increase in area of spread between infusion and PCEA. The area of spread was calculated for each technique: manual bolus: 119.16 cm²; PCEA: 25.99 cm²; infusion: 11.84 cm².

Conclusions: In-vitro experiment has shown a manual bolus to have wider spread than both continuous infusion and PCEA automated bolus. PCEA bolus was noted to have over twice the spread of continuous infusion. This may be a contributory factor in the need for manual rescue top-ups with PCEA and continuous infusion. Further in vivo studies will examine frequency of rescue top-ups between the different modalities of administration.

References

P27 Management of epidurals in the late stages of labour: national survey of midwifery practice across the United Kingdom
R Dumpala, F Faulds, S Sagadai
Dept of Anaesthesia, James Paget University Hospital, Great Yarmouth, UK

Introduction: A significant proportion of epidurals are discontinued in the late stages of labour. This is contrary to NICE guidelines. It is difficult to digest the fact that women are deprived of pain relief in a futile attempt to reduce the incidence of instrumental delivery or caesarean section. This is a global and ongoing problem, but to our knowledge there is no national study in UK, hence, we did this telephonic survey.

Methods: This survey was conducted by contacting the senior midwife of all the consultant-led maternity units in the UK that appeared on the website birthchoicenuk.com. We interviewed the midwife in charge of the unit about their practice of discontinuing epidural analgesia, their choice of maintaining labour analgesia and reasons for discontinuing the epidural. They were asked to give a reflection of the practice of majority of units in their district.

Results: Total number of units in the UK: 209.

Reasons for non-response were mainly units being busy and not willing to give the information. All the units who discontinue epidural analgesia, did so to help women in pushing.

Discussion: We found that up to 1 in 5 maternity units discontinue epidural analgesia, despite lack of evidence to show any benefit. On the contrary, this practice might lead to administration of more local anaesthetic to treat breakthrough pain and might result in denser motor block leading to increased risk of instrumental delivery.1 We have to make a concerted effort to educate our midwifery colleagues to continue the labour analgesia until the end of third stage of labour. It has been shown that intermittent epidural boluses and patient-controlled epidural analgesia are better than continuous infusion,2 but our survey shows that up to 50% of the units are still using continuous infusion. This also needs to be addressed.

References
P28 Predictive criteria of difficult Tuohy needle insertion during labour analgesia

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Anaesthesia, Bichat Hospital, Paris, France

Introduction: Difficult or failed Tuohy needle insertion for lumbar epidural analgesia (LEA) puts the parturient at risk of poor pain relief, needle accidents (vessel or dura puncture) or emergency general anaesthesia. In this setting, preventive measures like ultrasonographic identification of the epidural space1 or early LEA may help. However, few studies have examined predictive criteria of LEA technical difficulty or failure during labour.2 The goal of this study was therefore to identify predictive criteria of difficult Tuohy needle insertion during labour.

Method: After IRB approval and informed consent, 330 parturients requiring LEA were included. After LEA completion, the operator filled in a form assessing: (1) difficulty of anatomical landmarks identification (iliac crests, lumbar spinous processes, interspinous spaces), (2) maternal characteristics (position, agitation, cervical dilation, body mass index at term, scoliosis, lordosis, ethnicity), (3) operator characteristics (experience, fatigue, workload, time of LEA) (4) and perceived difficulty of the procedure. LEA was considered difficult if Tuohy needle insertion required more than one skin puncture or one skin puncture but more than one redirection in the interspinous space. After univariate analysis with c2 test or Student’s t-test, variables with P<0.2 were entered into a logistic regression analysis.

Results: Among the 330 LEA, 121 were considered difficult (37%). There were no failures. Logistic regression analysis identified four independent variables: (1) difficulty identifying the interspinous space (OR=3.404; CI 95=1.439-8.053), (2) presence of lumbar scoliosis (OR=3.291; CI 95=1.829-5.922), (3) bad parturient positioning (OR=3.388; CI 95=1.623-7.073) and (4) parturient agitation during the procedure (OR=2.195; CI95=1.242-3.878). The difficulty of Tuohy needle insertion assessed by the operator increased with the number of criteria present. In 22% of the 330 procedures and in 50 % of the 121 difficult LEA, the operator thought that another identification method of the epidural space could have helped.

Discussion: Lumbar scoliosis and difficult identification of the interspinous spaces indicate the need for an alternative identification technique of the epidural space like echography. Parturient agitation and poor position quality suggest the interest of an early labour LEA. However, prospective validation of the four identified criteria is warranted.

References

P29 Preparation of spinal injectate, the danger of dead space: a survey of current practice

L Hulatt, C Wilson, M Davison
Department of Anaesthesia, Buckinghamshire Hospitals NHS Trust, Aylesbury, UK

Introduction: When preparing solutions for spinal injection, the use of a 5-μm filter device is recommended to prevent glass particles entering the injectate.1 This may also reduce the risk of bacterial contamination.1 The relatively large dead space of these devices, if not accounted for, can lead to the drug composition of the spinal injectate being different from that intended.2

Method: Anaesthetists in two district general hospitals were asked to simulate drawing up a mixture for spinal injection using a mock spinal preparation tray. The required mixture was bupivacaine 12.5 mg (2.5 mL) and fentanyl 15 μg (0.3 mL). A proforma was used to document the precise method used to prepare this.

Results: 42 anaesthetists (19 consultants, 5 NCCG, 18 trainees) were observed. The dead space of the filter device was not accounted for during preparation of the injectate in 17 cases(40%). This led to the errors shown in the table below:

<table>
<thead>
<tr>
<th>1st Drug</th>
<th>Error</th>
<th>No.</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bup</td>
<td>Bup left in dead space before fent drawn</td>
<td>13</td>
<td>Over-dose bup Under-dose fent</td>
</tr>
<tr>
<td>Bup</td>
<td>Filter flushed with saline</td>
<td>1</td>
<td>Correct bup Under-dose fent</td>
</tr>
<tr>
<td>Fent</td>
<td>Fent left in dead space before bup drawn</td>
<td>3</td>
<td>Over-dose fent Under-dose bup</td>
</tr>
<tr>
<td>N/A</td>
<td>One or both drugs not filtered</td>
<td>6</td>
<td>Glass particles Lack of sterility</td>
</tr>
</tbody>
</table>

Bup: bupivacaine; Fent: fentanyl

Discussion: The filter device used in the hospitals surveyed (Portex 19-gauge x 38-mm 5-μm filter needle) has a dead space of 0.3 mL. Failure to consider this volume will result in the drug composition differing from that intended. If the injectate is to contain fentanyl 15 μg (0.3 mL), this failure will result in a variation of the amount administered from zero to 30 μg. This could lead to an ineffective block or increased opioid side effect. The dose of bupivacaine would also vary, causing an unexpectedly high or low block. Between drawing up each drug we recommend flushing the filter device with air to clear the dead space. A filter device should always be used when drawing up spinal drugs to remove glass particles and reduce the risk of spinal infection.

References
P30 Real-time ultrasound-guided epidural and spinal block for the obstetric patient

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Introduction: Epidural and spinal anaesthesia are blind techniques that from time to time may be technically difficult. Location of the epidural space by loss of resistance does not guarantee bilateral block. Spread of local anaesthetic may be patchy or unilateral due to the discontinuous and segmented anatomy of the lumbar epidural space. Further, both spinal and epidural anaesthesia are associated with nerve damage due to trauma to nerve roots or conus medullaris.

Our own experience of real-time ultrasound-guided neuraxial block suggests that use of a small curvilinear probe (9-3 probe, Zonare, Ca) placed in the longitudinal paramedian acoustic window gives the best images of the anatomy of the epidural space and vertebral canal. As only one study 5 years ago has used real-time ultrasound for combined spinal-epidural (CSE) anaesthesia the aim of our study was to use the latest advances in ultrasound technology to visualise spinal, CSE and epidural anaesthesia in real time.

Method: For this open, descriptive pilot study, we consented three patients (two before elective caesarean section and one in early labour) to have ultrasound imaging of spinal, CSE and epidural anaesthesia. Before each intervention, GM scanned the paramedian acoustic window at L3 and L4. Anaesthesia was performed by BM in all three patients with the spinal or epidural introducer in the midline and the ultrasound probe in the longitudinal paramedian position. After the ultrasound beam was optimised, local anaesthetic was injected and video imaging was undertaken for 30 s. Data were stored as DICOM files.

Results: In all patients the visibility of the spinous processes, ligamenta flavae, dura, epidural space and posterior longitudinal ligament was either very good or excellent. In one patient colour mapping showed blood flow in the epidural space.

Spinal anaesthesia was associated with anterior expansion and relaxation of the intrathecal space lasting 10-15 seconds. Epidural injection alone or as part of a CSE was associated with expansion and bilateral distribution of local anaesthetic within the epidural space. Recorded images show the temporal sequence of tissue expansion.

Conclusion: We have shown in this small open study that it is possible to record real-time spinal and epidural anaesthesia. Studies are required to determine the ideal spatial relationship between needles and ultrasound beam, optimal needle design and whether single or double operators are required.

Reference

P31 Regional analgesia for labour: a survey of UK practice

A Prabhu, F Plaat,*
Department of Anaesthesia, North West London Hospitals NHS Trust, London, UK, *Department Of Anaesthesia, Queen Charlotte Hospital, London, UK

Introduction: There is a growing body of evidence that decreasing the amount of local anaesthetic used to provide regional analgesia in labour enables mobility, may increase satisfaction and is associated with fewer assisted deliveries compared to higher doses. We wanted to establish how commonly low-dose regimes are currently being used for labour analgesia.

Method: Following approval of the OAA, a postal questionnaire was sent to the lead clinician of all consultant-led units in the UK in April 2008.

Results: The response rate was 80%. For establishment of labour analgesia, 80% of units use only epidurals, 19% perform either epidural or combined spinal-epidural (CSE), whilst 1% routinely use CSE. The most commonly used local anaesthetic was bupivacaine (92%) whereas levobupivacaine (7%) and ropivacaine (1%) were rarely used. Of those using bupivacaine to establish analgesia, the majority (80%) use a pre-mixed solution of bupivacaine 0.075%, 0.1% or 0.125% with fentanyl 2 µg/ml, the most common volume being 15-20 mL. Thirteen percent of units use ‘conventional’ doses of bupivacaine (10 mL of 0.25% bupivacaine). In 5 units, 0.5% bupivacaine is still prescribed for labour analgesia. Fentanyl was the commonest opioid used (99%). Of those units that used CSE to establish labour analgesia, 60% used 2.5-4 mL of a pre-mixed low dose mixture (0.1% bupivacaine with fentanyl 2 µg/mL). The rest used 1-2 mL of 0.25% bupivacaine, with or without an opioid. A solution of 0.1% or 0.125% bupivacaine with fentanyl 2 µg/mL was used to maintain analgesia by the vast majority of units (97%); 35% units used continuous infusion to maintain analgesia, 26% midwife controlled top-ups, 6% either and 25% used patient-controlled epidural analgesia (PCEA). Of those who used PCEA, 48% did not use a background infusion.

Conclusions: Although there is a wide variation in epidural practice across the country, 10% units still use ‘conventional’ epidural doses. Despite their superior safety profiles, the newer local anaesthetic agents are rarely used. PCEA has become an established technique although consensus about the use of background infusions is still lacking.

Reference
P32 The influence of deprivation on mode of delivery and use of labour epidural analgesia

A Ankers, R Sashidharan
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Introduction: The link between socio-economic deprivation and maternal and neonatal mortality and morbidity has been known for many years. We conducted a five-year retrospective audit of women delivering at the Royal London Hospital (RLH) to examine whether deprivation influenced mode of delivery or the use of epidural analgesia in Labour.

Method: Approval was granted by the Trust’s Clinical Effectiveness and Information Governance Units. The maternity database was used to provide details of all births at RLH between 2002 – 2007. Deprivation was measured using the Index of Multiple Deprivation 2007. Women were assigned to two groups. Most deprived contained women who lived in areas ranked in the top 10% most deprived in England. Less deprived included all others. χ² statistical analysis was used. Two tailed P<0.05 was significant

Results: 23,778 women delivered at RLH in 2002 – 2007. 74 women had incomplete records and were excluded. The most deprived had an epidural rate of 16.5 % and a caesarean rate of 18.9 %. The less deprived had rates of 37.2 % and 36.5 % respectively.

<table>
<thead>
<tr>
<th>Most deprived (n)</th>
<th>Less deprived (n)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deliveries 17492</td>
<td>Labour epidurals 2900</td>
<td>0.000001</td>
</tr>
<tr>
<td>Labour epidurals 2900</td>
<td>Instrumental delivery 908</td>
<td>0.000001</td>
</tr>
<tr>
<td>Caesarean delivery 3299</td>
<td>2267</td>
<td>0.00000</td>
</tr>
</tbody>
</table>

Conclusion: The most deprived women were least likely to receive epidural analgesia and have an instrumental or caesarean delivery.

References

P33 Use of ‘mobile epidurals’ in the UK

A Prabhu, F Plaat,*
Department of Anaesthesia, North West London Hospitals NHS Trust, London, UK, *Department of Anaesthesia, Queen Charlotte Hospital, London, UK

Introduction: We have found that expectant mothers frequently ask for ‘mobile epidurals’ and explain they believe this will enhance the progress of labour. The evidence for this is lacking. Indeed the greatest benefit of ambulation in labour may be the prevention of prolonged periods of recumbence, reducing the risk of thromboembolic complications, supine hypotension and improving fetal well-being. Mobility may decrease the risk of developing pressure sores.

We aimed to obtain information regarding the practice of mobile epidurals across the country.

Method: Following approval of the OAA, a postal questionnaire was sent to all consultant-led units in the UK in 2008.

Results: The response rate was 80%. Only 34% units allowed their labouring mothers to mobilise after establishing epidural analgesia. Of those that did, the majority (95%) stated that <50% of mothers actually did mobilise. The reasons for not allowing mothers to mobilise at all were: lack of staff (69%), trust policy (25%), medicolegal reasons (27%), lack of evidence of any benefit (37%). 26% of respondents believed that women didn’t actually want to mobilise anyway. Contraindications to mobilisation included: Syntocinon augmentation of labour (100%), lack of intact proprioception (100%) and lack of telemetry (80%). Only 40% had the facility of telemetry whereas 63% units required continuous fetal monitoring after commencement of epidural analgesia. The remainder did intermittently or after top-ups. 48 % of these units had a policy to assess motor block prior to mobilisation. Only 39% of those who did not allow their mothers to mobilise checked for pressure sores.

Conclusions: Both amongst units that allowed and those that prohibited ambulation with regional analgesia, there was the belief that the majority of women would not wish to do so anyway. Although it has been shown that ambulation can be safe, it is worrying that not all units that allow mobility assess motor block first. The incidence of pressure sores in the labouring population is unknown but it is of concern that precautions are not being taken by the majority of units.

References
P34 A four-year comparative outcome study of obese versus non-obese obstetric patients
N Uwubamwen, N M Girish Sadhu
Department of Anaesthesia, Trafford General Hospital, Manchester, UK

Introduction: The prevalence of obesity among parturients continues to increase and is known to be associated with suboptimal pregnancy outcomes. It is a major cause of preventable morbidity and mortality. Our objectives were to observe and compare the clinical characteristics and outcome of obese against non-obese parturients over a period of four years.

Method: A prospective study of all pregnant women with body mass index (BMI) of ≥30 kg/m² who were admitted to Trafford General Hospital between January 2004 and December 2008 was conducted. They were compared with an equal number of pregnant women with BMI <30 kg/m² admitted during the same period. A proforma was completed for the two groups and data were analysed using SPSS 16.0. All categorical variables were analysed using χ² test or Fischer’s exact test.

Results: There were 654 women with BMIs 30-69 kg/m² admitted during the 4-year period. 443 women had BMIs 30 to 35, 135 women had BMIs 36 to 40 and 76 women had BMIs >40 kg/m². On comparison with 654 non-obese pregnant women, the difference in clinical characteristics, mode of delivery and anaesthetics was clearly evident.

<table>
<thead>
<tr>
<th>Body mass index</th>
<th>&lt; 30 kg/m²</th>
<th>&gt;30 kg/m²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preeclampsia</td>
<td>34 (5.1%)</td>
<td>54 (8.3%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Gestational diabetes</td>
<td>7 (1.1%)</td>
<td>27 (4.1%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>3 (0.4%)</td>
<td>9 (1.4%)</td>
<td>0.09</td>
</tr>
<tr>
<td>Hypertension</td>
<td>11 (1.7%)</td>
<td>17 (2.6%)</td>
<td>0.34</td>
</tr>
<tr>
<td>Caesarean section</td>
<td>372 (56.9%)</td>
<td>419 (64.1%)</td>
<td>0.009</td>
</tr>
<tr>
<td>Instrumental delivery</td>
<td>61 (9.3%)</td>
<td>56 (8.6%)</td>
<td>0.7</td>
</tr>
<tr>
<td>General anaesthesia</td>
<td>32 (8.6%)</td>
<td>33 (7.9%)</td>
<td>1</td>
</tr>
</tbody>
</table>

Discussion: We have demonstrated a definite increase in risk of obese parturients having concurrent medical problems or superimposed antenatal disease such as preeclampsia and gestational diabetes. They have a tendency to labour abnormally resulting in an increase in interventional deliveries. Our findings are consistent with findings in other similar studies.1-5

References

P35 Body mass index and needle length for obstetric epidural techniques
H Murgatroyd, RC Wilson, H McLure, GR Lyons
Department of Obstetric Anaesthesia, St James’s University Hospital, Leeds, UK

Introduction: For the conduct of obstetric epidural techniques, if the likely depth to the space (DTS) is known, an appropriate length of needle can be selected from the start of the procedure and failure could be avoided. Studies to date have shown variable success in accurately predicting the DTS from biometric variables such as height, weight or body mass index (BMI).1-3

Method: We conducted a retrospective observational study of DTS in obstetric patients at St James’s University Hospital (SJUH). Four thousand and forty-four obstetric epidural procedures sited between September 2005 and August 2008 were identified. Women were divided into groups according to BMI, creating groups containing all cases with a BMI above a given cut-off value (>30, >35, >40, >45, >50). These groups were further divided according to DTS, whether it was greater or less than 7 cm. The numbers of patients with DTS above and below 7 cm in each BMI group were compared, giving an odds ratio (OR) at each BMI cut-off.

Results:

<table>
<thead>
<tr>
<th>BMI cut-off (kg/m²)</th>
<th>Number of cases in &gt;7 cm</th>
<th>Number of cases in &lt;7 cm</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;30</td>
<td>159</td>
<td>743</td>
<td>0.21</td>
</tr>
<tr>
<td>&gt;35</td>
<td>108</td>
<td>235</td>
<td>0.46</td>
</tr>
<tr>
<td>&gt;40</td>
<td>54</td>
<td>53</td>
<td>1.02</td>
</tr>
<tr>
<td>&gt;45</td>
<td>22</td>
<td>13</td>
<td>1.69</td>
</tr>
<tr>
<td>&gt;50</td>
<td>9</td>
<td>3</td>
<td>3.00</td>
</tr>
<tr>
<td>Total</td>
<td>196</td>
<td>3848</td>
<td></td>
</tr>
</tbody>
</table>

Discussion: Three lengths of 18-gauge Tuohy needles are available at SJUH; a standard 8 cm, and two longer needles of 9 and 11 cm. Because of likely variation in technique between practitioners, a DTS greater than 7 cm was taken to indicate that a longer needle than standard should have been used from the start of the procedure. If the BMI is 40 or greater, 50% of women would have had their epidural successfully placed with a standard needle, 27% will have needed a 9cm needle and 23% an 11cm needle. Selecting a longer needle for the morbidly obese from the outset will increase chances of initial success, and have implications for the procurement of equipment.

References
P36 Morbid obesity in obstetrics: a re-audit of CEMACH recommendations

A P Shannon, G M Yuill
Department of Anaesthesia, Stockport NHS Foundation Trust, Stockport, UK

Introduction: There is growing evidence that obesity in pregnancy increases morbidity and mortality for both the mother and the baby. In addition to previous recommendations regarding antenatal referral and thromboprophylaxis, the CEMACH 2003-2005 report advises that morbidly obese women should not be anaesthetised by trainees without direct supervision. In our hospital, audit data from 2005 showed an inadequate system for the detection and referral of the morbidly obese parturient, resulting in additional training and resources being allocated. Therefore, we present a re-audit aiming to assess our performance against current guidance from CEMACH.

Methods: The booking body mass index (BMI) of all women who delivered in October and November 2007 was recorded retrospectively, and the case notes of women with a BMI >35 kg/m² (morbidly obese) were examined further. Data were collected to establish referral rates to the anaesthetic clinic, supervision given to trainees relative to the time of day and if thromboprophylaxis was prescribed correctly.

Results: 604 case notes were reviewed (37 were not available). Of these, 92% had their booking BMI documented, and 39 patients were found to be morbidly obese. Antenatal referral: 80% of morbidly obese women were referred appropriately compared with 15% in 2005. Anaesthetic supervision (n=21): Direct consultant supervision was present for 90% of elective caesarean sections, 12% of emergency caesarean sections and 25% of anaesthetics given for other emergency procedures (e.g. assisted vaginal delivery); 33% of anaesthetics were given out of hours, i.e. 17:00-08:00. Thromboprophylaxis: 94% of women having a caesarean delivery and 32% having a vaginal delivery were suitably prescribed thromboprophylaxis, compared with 100% and 0% in 2005 respectfully. Only 52% of those prescribed thromboprophylaxis were given the correct dose.

Discussion: We have shown a significant improvement in the detection and referral of morbidly obese patients to the anaesthetic clinic. A more robust mechanism to identify patients requiring thromboprophylaxis is needed, particularly if indicated following vaginal delivery, with additional guidance on correct dosing. Finally, our audit shows the potential difficulty obstetric anaesthesia services will have in delivering CEMACH recommendation that morbidly obese women should be anaesthetised by trainees only with direct supervision.

Reference

P37 Obesity in obstetric anaesthesia: an audit of anaesthetic management

J D Griffin, D Portch, J Thurlow
Department of Anaesthesia, Musgrove Park Hospital, Taunton, UK

Introduction: There is substantial evidence that obesity in pregnancy contributes to increased morbidity and mortality for both mother and fetus. As a consequence CEMACH made specific anaesthetic recommendations for the management of the morbidly obese woman. We audited the anaesthetic management of obese parturients in our hospital over a two-year period.

Method: We retrospectively identified 139 women with a booking BMI of 35 kg/m² who had received an anaesthetic on the labour ward between September 2006 and August 2008. Using patient notes and the midwives on-screen maternity register (STORK) we collected information on their anaesthetic management.

Results: Thirty-one percent of cases were referred to the anaesthetic antenatal service. Indications for anaesthetic given, type and time of anaesthetic are detailed below.

<table>
<thead>
<tr>
<th>Indication for anaesthetic</th>
<th>Caesarean section</th>
<th>Instrumental tear</th>
<th>MROP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of anaesthetic (all procedures)</td>
<td>Spinal</td>
<td>Epi. top up</td>
<td>GA CSE</td>
</tr>
<tr>
<td>Time of anaesthetic</td>
<td>0800-1800</td>
<td>1801-0000</td>
<td>0001-0759</td>
</tr>
</tbody>
</table>

MROP: manual removal of placenta

The consultant anaesthetist was present for 44% (61 of 139) of cases. This consisted of 65% (59 of 91) of cases in normal working hours, but only 4% (2 of 48) of cases out of hours. 97% (59 of 61) of the consultant anaesthetist's work occurred in normal working hours. The ST3-7 was the most senior anaesthetist present in 49% (68 of 139) of cases. They did 96% (46 of 48) of the out-of-hours work, 59% (10 of 17) of the general anaesthetics, and 91% (10 of 11) of the category-1 sections. Only 38% of the ST3-7 cases occurred in normal working hours.

Discussion: Currently the anaesthetic registrar undertakes the majority of the work with these high risk morbidly obese women in our hospital, usually working alone and out of hours. This falls well short of the recommendations from the CEMACH report. A minority of these women in our unit were referred for anaesthetic assessment as part of their antenatal care. As a consequence a protocol for multidisciplinary assessment and planning of these high-risk women along CEMACH guidelines is in progress and will be implemented in the near future.

Reference
P38 Outcome of super-obese parturients delivering at a tertiary obstetric unit

P Zuokumor, M Abdeldalami, P Kochhar
Dept Anaesthesia, Manchester Royal Infirmary, Manchester, UK

Background: Obesity is a major health care problem. Prevalence of obesity in pregnancy is increasing. 1 A recent CEMACH report stated that obese pregnant women are at risk of obstetric and anaesthetic complications. 2 Outcome studies on super-obese parturients are sparse. The aim of this audit is to review obstetric and anaesthetic outcome of super-obese women delivering in our unit.

Method: From our database, women with BMI >50 kg/m² who delivered between 2002 and 2007 were identified and the obstetric and anaesthetic outcomes analysed using a structured proforma.

Results: 29 parturients were identified who had a total of 61 deliveries (0.22% of deliveries in our unit). Mean age (95% CI) was 31 (2.3) years. 7 were primigravidae and 10 had parity >3. Less than 50% had antenatal anaesthetic assessment. Mean weight, height and BMI at booking were 133.4 (3.96) kg, 160 (2.3) cm and 52 (1.3) kg/m² respectively. 18 were white, 6 were black and 4 were Asian. Comorbidities included asthma (38%), hypertension (24%) and diabetes (21%). Obstetric issues included preterm, stillbirth and previous caesarean section (CS). Gestational age at booking was 17.9 (3.5) weeks and at delivery 39 (1) weeks. Over 40% had labour induced. Mode of delivery: 21 had NVD, 4 had emergency CS, 2 had elective CS, one assisted breech delivery and one forceps delivery. Labour analgesia: 19 had Entonox, 11 had i.m. opioid and 6 had epidural. 6 had no analgesia. Duration of labour was 380 (147) min. There were 27 singleton live births and two stillbirths. Mean birth weight was 3403 (303) g and all live birthweights were normal. Apgar score at 5 min was 9.7 (0.28). One baby had cystic hygroma. Blood loss was 250 (65) mL. Anaesthetic registrars inserted all epidural catheters except one and all but one was effective. L3/L4 was the interspace often used and depth of space was 8-12 cm. Other problems were difficulty with venous access and monitoring blood pressure. Indications for CS included previous CS, breech presentation, low fetal pH, failure to progress and placenta praevia. 3/7 had spinal, 2/7 had epidural top-up, 1/7 had CSE and 1/7 had GA. Standard monitoring was used. Surgery was difficult in most cases. Recovery was uneventful. Senior anaesthetists and obstetricians were present for elective cases. Postoperatively one patient had wound infection, one had leg weakness from epidural infusion and one had leg pain. Average length of stay was 5.4 (1.5) days.

Discussion: Increasing numbers of young women are super-obese. Despite associated comorbidities and higher rates of labour induction, most deliveries were uneventful. Preferred labour analgesia was Entonox. Babies delivered were of normal weights and in good condition. Neuraxial anaesthesia was preferred for CS. Invasive monitoring and HDU or ICU care was unnecessary.

References

P39 Should obstetric patients be weighed before anaesthesia?

A Kant, M Dresner
Anaesthetics, Leeds General Infirmary, Leeds, UK

Introduction: Despite the association between obesity and maternal death, 1 there is a cultural reluctance to weigh obese parturients regularly in the UK. Anaesthetic national guidance specifically advocates up-to-date weight measurement before anaesthesia, 2 yet in obstetrics early pregnancy (booking) or estimated weights are often all that is available. Is this acceptable?

Aims: To measure and compare weight change between booking and term in obese and non-obese women, and to assess the accuracy of patient and anaesthetist estimates of term weight.

Methods: Data were collected prospectively from 76 women presenting for elective caesarian section over a 12-week period. Booking height and weight, patient and anaesthetist estimates of term weight, and measured term weight were recorded.

Results: Of the 72 women who were weighed at booking, 25% were obese (BMI >30 kg/m²). This rose to 50% at term. Women gained an average ± SD 11.9 ± 5.5 kg with no significant difference between obese (10.2 kg) and non-obese (12.4 kg). 74% of anaesthetists and 68% of women (who volunteered to guess) underestimated the weight by an average 6.8 kg and 5.2 kg respectively. Women who refused to estimate their weight (28%) were more likely to be obese (56% versus 19%, P<0.05).

Conclusions: In this study, women usually underestimated their term weight and those who made no estimate left this task to anaesthetists who were even more prone to underestimation. Given the variable and sometimes large weight gain seen in pregnancy, assumptions based on booking weights cannot be relied upon. It is now standard practice to weigh patients in other surgical specialties, and obstetrics should be no different. Given that the need for surgery cannot always be predicted, we suggest that all women be routinely weighed at their last antenatal check or on admission for delivery. The current practice of weight estimation is inadequate.

References
**P40 Survey of existing anaesthetic guidelines for managing morbidly obese parturients in the North-West region**

K Veerabadran, VK Melachuri, S Gandhi
Anaesthetics, Tameside General Hospital NHS Foundation trust, Ashton-u-Lyne, UK

**Introduction:** The global epidemic of morbid obesity is an increasing problem in obstetrics and is identified as a significant contributing factor for maternal mortality. 1,2 We conducted a postal survey in the Northwest region to identify the practice in managing these patients.

**Method:** Questionnaires were sent regarding the time and reasons for anaesthetist’s involvement, nature of evaluation and information given to patients at pre-op assessment. We also surveyed the availability of specific equipment and anaesthetic practice for bariatric mothers.

**Results:** We received 57% responses for the questionnaires. 11 out of 16 units had formulated guidelines and 75% of patients were referred in the first trimester. 44% of departments assessed patients only if BMI is >35 kg/m² and 37.5% assessed if BMI is >40 kg/m². Nearly all anaesthetists examined and discussed difficult intubation but only 56% discussed anticipated difficulty in regional techniques and poor neonatal outcome was rarely discussed. 81% convened a case conference if there were associated medical or obstetric problems. All but one department preferred spinal as the first choice. 75% felt two senior anaesthetists must be routinely involved in management of obese parturient.

The results are displayed in graphical pattern with Y axis denoting the % of obstetric units following these principles and X axis showing parameters as listed (A: consultant involvement, B: operating table >150 kg, C: arterial line with unreliable BP, D: dedicated fiberoptic scope, E: consultants using fiberoptic, F: spinal as preferred technique, G: manage post op in labour ward, H: scalp electrode)

**Fig. Anaesthetic practice for bariatric mothers**

**Conclusion:** All the units do not have formal guidelines on management of morbidly obese mothers as recommended by the OAA. Pre-op assessment should include evaluation of airway and difficulties for regional anaesthesia. All the mothers are not given adequate information on the challenges related to regional blockade and poor neonatal outcome.

**References**

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**P41 The effect of change in BMI during pregnancy on obstetric anaesthesia outcomes**

S Desai, SL Maguire, MO Columb
Dept of Anaesthesia, University Hospital of South Manchester, Wythenshawe, UK

**Introduction:** Obesity is an independent factor affecting obstetric and anaesthetic outcomes. 1 We wanted to assess the influence of change in BMI during pregnancy on outcome.

**Method:** The BMI of women at booking and term were compared. Demographics, labour outcomes, obstetric and anaesthetic interventions were recorded as well as birth weight.

**Results:** 112 women were included in this study. The mean change in BMI was 5.2 kg/m², with patients having an average booking BMI of 26.6 kg/m² and delivery BMI of 31.8 kg/m². The BMI change was calculated per day and then multiplied by 182 days, the time between a standard 14-week booking and 40-week delivery. This changes the average corrected BMI change to 4.87 kg/m². As expected there is a correlation between change in BMI and birth weight.

**Fig. BMI change vs Birth Weight**

The mean BMI change for those women who had any anaesthetic intervention was 5.1 kg/m² compared to 4.3 kg/m² for those who had no anaesthetic intervention. The mean BMI change of those women requiring caesarean section was 6.4 kg/m² compared to 4.1 kg/m² for those who had vaginal deliveries. There was no correlation between booking BMI and change in BMI. BMI change had no effect on gestation at delivery.

**Discussion:** In the UK where caesarean section rates are already high, large BMI increased may increase the risk of requiring operative delivery and regional anaesthesia. While increased BMI itself is a recognised risk factor for obstetric and anaesthetic intervention, further work on the effect of change of BMI during pregnancy (irrespective of booking BMI) is needed. Dietary advice may be useful in increasing the rate of normal vaginal deliveries.

**Reference**
P42 Trainee supervision for out-of-hours emergency caesarean section in the morbidly obese

C Eckersley, P Stone, J Reid
Anaesthetic Department, Queen Mothers Hospital, Glasgow, UK

Introduction: The latest CEMACH report highlighted the importance of morbid obesity in the morbidity and mortality of pregnant women. It recommends that these women should not be anaesthetised by trainees without direct supervision.

Aim: To investigate our unit’s current practice regarding senior supervision of trainees at caesarean section in the morbidly obese and identify any anaesthetic complications in those patients who delivered out of hours.

Method: Patients delivering during normal working hours i.e. 0830 -1700 Monday to Friday, were assumed to have immediate supervision from the duty consultant. We included patients with BMI ≥39.5 kg/m² who underwent caesarean section outwith these hours in the period 30/7/02 to 31/3/08. BMI data were obtained from an ongoing prospective infection control audit. We reviewed these patients’ casenotes and the theatre logbook and noted evidence of senior supervision, mode of anaesthesia, difficulties encountered and incidence of complications.

Results: Total number of caesarean sections was 5151, 4480 (87%) had BMI data available. Of these 126 (3%) had BMI >39.5 (range 39.5 - 55.4, mean 43.7, SD 3.6). 44 (37%) patients underwent CS out of hours. There was documented senior supervision for 12/44 patients (27%). Casenotes were available for 39/44. Difficulty in siting was defined as ≥3 attempts or requiring long needle.

<table>
<thead>
<tr>
<th>Anaesthetic interventions</th>
<th>Difficulty sitting + complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>(45 in 39 patients)</td>
<td></td>
</tr>
<tr>
<td>Epidural n = 18</td>
<td>8/18 (44%) difficulty siting</td>
</tr>
<tr>
<td>Spinal n = 17</td>
<td>6/17 (35%) difficulty siting</td>
</tr>
<tr>
<td>CSE n = 4</td>
<td>2/4 (50%) difficulty siting</td>
</tr>
<tr>
<td>GA n = 6</td>
<td>2/6 (33%) difficult spinal component</td>
</tr>
<tr>
<td>2 de novo</td>
<td>nil</td>
</tr>
<tr>
<td>2 epidural conversion /</td>
<td>2/2 (100%) difficult intubation</td>
</tr>
<tr>
<td>breakthrough pain</td>
<td></td>
</tr>
<tr>
<td>2 epidural conversion /</td>
<td></td>
</tr>
<tr>
<td>massivenil PPH</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion: We currently do not meet the CEMACH recommendations regarding morbidly obese patients and trainee supervision. 12/44 (27%) of out of hours caesarean sections had documented direct supervision. We found a high incidence, 41% (16/39) of difficulty in siting regionals and also 11% (2/18) of epidurals required intraoperative GA conversion for breakthrough pain, and both were difficult intubations. These findings back up the need to comply with the CEMACH recommendations.

Reference

P43 Weight gain during pregnancy: review of practice?

S Sivasubramaniam, N Mathew, R Akhtar
Department of Anaesthetics, University Hospital of North Staffordshire, Stoke on Trent, UK

Introduction: Obese parturients are at increased risk from anaesthesia and should be referred to the anaesthetist early. Women with a BMI >40 kg/m² are referred to the anaesthetist in our unit. NICE recommends that women with a BMI >35 kg/m² should be referred to the anaesthetist. There is concern we could be missing a significant proportion of women with BMI just less than 40 kg/m² who are not referred at booking but can be well above 40 kg/m² when coming for caesarean section.

Method: Over a three-month period, we recorded the weight of 100 parturients scheduled for caesarean section on the day of surgery. We compared this with their booking weight and BMI.

Results: Of 100 patients, 17 had a BMI >35 kg/m², of which 6 patients had BMI >40 kg/m². The remaining 11 patients with BMI between 35 and 40 kg/m² were not referred to the anaesthetist. The average weight gain for the whole group of 100 patients was 10.6 kg. The average weight gains for parturient with BMI >40 kg/m² at booking was 9.2 kg and for those between BMI of 35 and 40 kg/m² was 7.9 kg.

<table>
<thead>
<tr>
<th>Booking BMI</th>
<th>Total no.</th>
<th>Average wt gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;35 kg/m²</td>
<td>83</td>
<td>11 kg</td>
</tr>
<tr>
<td>35-40 kg/m²</td>
<td>11</td>
<td>7.9 kg</td>
</tr>
<tr>
<td>&gt;40 kg/m²</td>
<td>6</td>
<td>9.2 kg</td>
</tr>
</tbody>
</table>

Four patients had a BMI <40 kg/m² at booking but were more than 40 kg/m² on the day or caesarean section.

Conclusion: This demonstrated that the average weight gain for the obese parturient is similar to the non obese parturient. With the average weight gain around 12 kg it can be expected that women with BMI just less than 40 are likely to be more than 40 kg/m² at the time of caesarean section. This is unlikely to change management significantly but could result in a huge workload if all parturient with BMI more than 35 kg/m² are referred.

Reference
P44 200% increase in conversion rate: audit of technique of anaesthesia for caesarean section
PN Gunasekera, M Purva, IF Russell
Womens & Childrens Hospital, Hull Royal Infirmary, Kingston upon Hull, UK
Introduction: Use of regional anaesthesia (RA) should be maximized for caesarean sections.¹
Method: We analysed retrospectively the type of anaesthesia for caesarean section from July 2007 to July 2008 and compared this with previous data.
Results: The RCOA recommends RA for >95% elective & >85% emergency caesarean section. Over 2003-2008 we had 98%, 99%, 98%, 99%, 99% for elective (EL) & 94%, 91%, 92%, 88% & 88% for emergencies (EM). Our conversion rate for EL caesarean section was 0.5% consistently over 2003-08 compared to the standard of <1%. The standard for conversion in EM caesarean section is <3%. We had rates of 1.9%, 2.5%, 2.9%, 3.5%, and 5.5% from 2003-08. The reasons for the conversions in 07-08 are shown.

These results show a statistically significant increase in percentage of RA to GA conversions for EM caesarean section (P <0.05), when comparing 07-08 with 03-04. 66% of conversions were between 8am and 8pm. 67% of conversions were by consultants or senior registrars.

Conclusions: There has been a steady increase in conversion rate in EM caesarean section. We need to identify the conversions that could have been avoided.
Lack of time for epidural top-up to work: Accepting sensory block height below the traditional level may allow the obstetrician to deliver the baby, when time the block would have ascended. However this needs full discussion with the mother assuring a quick GA if required. Fetal resuscitation should be considered. Improving communication between the obstetric and anaesthetic teams will help. It takes 3 min to prepare our top-up (lignocaine/fentanyl/adrenaline) and 14 min for a T7 block to be achieved. Hence early notification will be helpful. The use of premixed top-up syringes and alkalisation of top-up could be considered.

Under-functioning labour epidurals: Critical assessment and proactive resiting may rectify failing epidurals. Midwives should be trained to assess block height. Assessment of block level is crucial. In 2 conversions an incorrect initial assessment of level led to a GA conversion once surgery had begun.

Reference

P45 Anaesthesia for caesarean section in premature infants
Y Stefak, TC Thomas, R Russell
Nuffield Department of Anaesthetics, John Radcliffe Hospital, Oxford, UK
Introduction: Spinal anaesthesia (SA) for caesarean section (CS) has been associated with potentially harmful effects on the baby when compared to epidural and general anaesthesia (GA). Most data come from studies of elective CS in term infants; little is known of the effect on outcome in premature infants.
Methods: Notes of women who underwent CS at <33 weeks’ gestation in 2006-07 were reviewed. Data on anaesthetic technique and neonatal outcome were collected. The health of the baby at 28 days and 3 months was recorded.
Results: 118 CS were identified of which 78 case notes were available. There were 9 twin deliveries. SA was used in 58 cases, GA in 18 and epidural in two. Epidurals were not included in further analysis.

<table>
<thead>
<tr>
<th></th>
<th>Spinal</th>
<th>GA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) (median; range)</td>
<td>31 (18–45)</td>
<td>30 (15–39)</td>
</tr>
<tr>
<td>Gestation (days) (median; range)</td>
<td>215 (196–232)</td>
<td>218 (188–228)</td>
</tr>
<tr>
<td>Birth weight (g) (mean ± SD)</td>
<td>1483 ± 816.6</td>
<td>1396 ± 361.7</td>
</tr>
<tr>
<td>Umb venous pH (mean ± SD)</td>
<td>7.31 ± 0.07</td>
<td>7.28 ± 0.08</td>
</tr>
<tr>
<td>Umb arterial pH (mean ± SD)</td>
<td>7.27 ± 0.07</td>
<td>7.26 ± 0.08</td>
</tr>
<tr>
<td>Umb venous BE (mean ± SD)</td>
<td>-3.31 ± 2.85</td>
<td>-3.86 ± 4.56</td>
</tr>
<tr>
<td>Umb arterial BE (mean ± SD)</td>
<td>-3.83 ± 3.0</td>
<td>-4.48 ± 3.9</td>
</tr>
<tr>
<td>Apgar 1 min (median; range)</td>
<td>8 (2–10)</td>
<td>7 (3–9)</td>
</tr>
<tr>
<td>Apgar 5 min (median; range)</td>
<td>8 (2–10)</td>
<td>9 (4–10)</td>
</tr>
</tbody>
</table>

Maternal age, gestation and birth weight were similar. The median dose of bupivacaine for SA was 12.5 mg (range 10-15). Fentanyl was added in 55 cases (median 15 µg, range 12.5–45) and diamorphine in 7 µg (median 300; range 200–300). Phenylephrine was used in 18 cases; epidural in six. Similar doses of bupivacaine were used with each vasocostructor. Apgar scores were similar in SA and GA groups (P>0.05). Umbilical venous gases were available in 49 and 15 cases and arterial gases in 51 and 13 cases of SA and GA, respectively. There were no significant differences between groups (P>0.05). There were no significant differences between SA and GA groups in the health of the baby at 28 days and 3 months. No differences in Apgar scores, cord gases or longer term outcome were observed between phenylephrine and epididine.

Discussion: We did not find a significant difference in neonatal outcome between SA and GA for CS in premature infants. However, numbers are small and data retrospective. Further studies are needed to determine the optimal mode of anaesthesia for CS in premature infants.

References
P46 Are we getting the dose right? A survey of current regional anaesthesia practice for caesarean section in the West Midlands

S Gnanasekaran, M Shanmugam, S Dinesh
Anaesthetics, Heartlands Hospital, Birmingham, UK

Introduction: Anaesthesia text books recommend a 12–15-mg intrathecal dose of hyperbaric bupivacaine with fentanyl 15 µg for caesarean section. Some recent studies suggest a far smaller dose of bupivacaine. We carried out a survey with view to identify the current practice in West Midlands.

Methodology: An online questionnaire in the form of a web link with questions relating to the type and dose of drugs used, whether this was varied for individual patients, the level of sensory block aimed for and how it was assessed, was sent to all consultant obstetric anaesthetists, trainees and non consultant career grade (NCCG) anaesthetists within the three schools of anaesthesia in the West Midlands. SurveyMonkey Application Services software was used to collect the online response and to analyze the results.

Results: Of the 136 respondents, 34 (25%) were consultants, 97 (71%) were trainees and 5 (4%) were NCCG anaesthetists.

The survey showed that almost all respondents used 0.5% heavy bupivacaine but the dose they used for a patient of normal height and weight varied from 9 to 19 mg with many altering the dose depending on the patient’s height. Many used fentanyl 15–25 µg, some used diamorphine and a few used morphine along with bupivacaine. Almost 95% of the respondents aimed for a block of up to T4 to cold (73%), touch or pinprick (22%).

Discussion: Our survey shows that a small but significant number of anaesthetists use large doses of local anaesthetic to achieve high blocks, despite evidence that lower doses can achieve adequate block. A block height of up to T5 to touch 2 being the current recommendation, this modality was not tested by 31% of our respondents. In the absence of nationally accepted guidelines for the management of intrathecal blocks for caesarean section, such variations in practice will continue to exist and may have medicolegal implications.

References

P47 Cold to touch: has changing the way we test our spinal blocks changed our rescue analgesia and general anaesthesia conversion rates?

G K Simpson, J Thurlow
Department of Anaesthesia, Musgrove Park Hospital, Taunton, Somerset, UK

Introduction: For any one individual it is not possible to predict the level of block to touch from a known level of block to sharp pinprick or cold. A block to touch at skin incision that includes T6 is likely to provide a pain-free caesarean section.1 Does a change in the method of testing blocks improve the chance of a pain-free caesarean section?

Method: Rescue rates and general anaesthesia (GA) conversion rates for all caesarean sections performed under spinal block were collected over a five-year period. Since 2005 we have refined the way we test our spinal blocks, initially with ice to ascertain an ascending block, and then confirmed with light touch by the mother before starting surgery, aiming for a block up to and including the T6 dermatome.

Results: The figure below combines data from all caesarean sections (Category 1–4).

Discussion: Current audit standards suggest <1% conversion from neuraxial to GA for elective caesarean section, and less than 3% conversion for emergency caesarean section.2 Data suggest that rates ≤1% at caesarean section are attainable.3 Our data series shows an improvement in GA conversion and rescue rates under spinal anaesthesia since 2005. In 2007 the GA conversion rates from spinal anaesthesia were 0.4% and 0.46% for elective and emergency caesarean section respectively. These figures comply with recommended audit standards.3 Since changing the way we test our spinal blocks as suggested by Russell1 we have seen an improvement in both our rescue rates and GA conversion rates and support the continued teaching and use of this method in testing the adequacy of spinal anaesthesia.

References
P48 Comparison of two doses of phenylephrine with crystalloid cohydration for prevention of spinal anaesthesia-induced hypotension during elective caesarean section: a double blinded randomised controlled study

T Ansari, M Hashem, A Razek, A Gamassy, A Saleh
Anaesthesia Departments, Corniche Hospital, Abu Dhabi, United Arab Emirates. *, Cairo University, Egypt

Introduction: Phenylephrine (PE) is replacing ephedrine as the drug of choice for preventing and treating spinal anaesthesia-induced hypotension in caesarean delivery. Although cohydration and high-dose PE (100 µg/min) can almost eliminate spinal-induced hypotension, it may be associated with significant bradycardia. The aim of this study was to compare maternal and fetal outcome using two different infusion rates of PE (50 & 100 µg/min) combined with cohydration.

Methods: Following ethics committee approval and informed consent, 117 mothers with normal singleton pregnancy at term scheduled for elective caesarean section under spinal anaesthesia were enrolled. Mothers were randomized into group A, who received a PE infusion of 50-µg/min, and group B 100 µg/min. Immediately after spinal anaesthesia, PE infusion started and an i.v. bolus of warm Hartmann’s solution (10 mL/kg) was administered as fast as possible, aiming at keeping systolic pressure between 80 to 100% of baseline. If needed a 50-µg rescue dose of PE was given or the infusion was discontinued as appropriate. Standard monitoring was used; fetal outcome was measured by Apgar score and umbilical artery and vein blood gases. Statistical analysis was performed using SPSS 14 for windows. Data was deemed significant if \( P<0.05 \).

Results: There were no significant differences between groups in systolic pressure, cohydration volume, Apgar score and fetal blood gases, but there were significant differences between the two groups regarding total PE dose, number of bradycardia episodes and number of rescue PE boluses.

<table>
<thead>
<tr>
<th>Group A (n=54)</th>
<th>Group B (n=63)</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total PE dose (µg) mean± SD</td>
<td>547 ± 95.7</td>
<td>775 ± 107</td>
</tr>
<tr>
<td>Bradycardia episodes, n (%)</td>
<td>1 (1.8%)</td>
<td>11 (17.4%)</td>
</tr>
<tr>
<td>Rescue PE boluses, n (%)</td>
<td>7 (12.9%)</td>
<td>1 (1.58%)</td>
</tr>
</tbody>
</table>

*denotes statistical significance

Conclusion: During caesarean delivery under spinal anaesthesia, cohydration combined with PE infusion of 50 µg/min achieved fetal and maternal outcomes similar to 100 µg/min, but with significantly less maternal bradycardia.

Reference

P49 Continuous non-invasive blood pressure monitoring and phenylephrine infusion: a perfect combination for caesarean sections under neuraxial anaesthesia

M Doraiswami, P Paraman, A Whiteman, S Kapoor
Dept. of Anaesthesia, Queen’s Hospital, Romford, UK

Introduction: It is essential to maintain cardiovascular stability during caesarean section under neuraxial anaesthesia. Phenylephrine has gained popularity for this purpose recently. For effective management, phenylephrine infusion should be titrated to near-baseline maternal blood pressure. If titrating phenylephrine with minimal time lag can be challenging. The continuous non-invasive arterial pressure (CNAP™) device provides continuous real-time monitoring of systolic, diastolic and mean arterial pressures. This allows a faster reaction to titrate phenylephrine infusion to minimal changes from baseline blood pressure.

Method: Following approval by the clinical audit department, we analysed our practice of using a phenylephrine infusion together with CNAP™. The phenylephrine infusion (50 µg/mL) was started at 20 mL/h immediately after the subarachnoid block and titrated aiming for baseline systolic pressure. Blood pressure, heart rate and phenylephrine infusion rate were recorded every minute until delivery following which the phenylephrine was discontinued. Surgical start time, delivery time, Apgar score, total phenylephrine used, additional vasopressors, total duration of CNAP™, incidence of intra-operative nausea and vomiting and subjective patient comfort with CNAP™ were recorded.

Results: Data were collected from 32 women (ASA 1 or 2) undergoing elective caesarean section under neuraxial anaesthesia; 20 women received single-shot spinal and 12 received CSE. Systolic Blood pressure rose 20% above baseline in one woman and systolic pressure fell 20% below baseline in 21/32 women. In all the cases it was easy to maintain the pressure to pre-regional anaesthetic level with minimal time delay, although 5/32 needed additional ephedrine boluses. The mean time from anaesthetic induction to delivery was 19.5 min. The mean total phenylephrine dose used was 489 µg. The mean duration of CNAP™ use was 56.2 min. The CNAP™ device was tolerated well. One patient complained of tingling and numbness in her fingers and another complained of a cold sensation in her fingers; both disappeared soon after CNAP™ was discontinued. Two women complained of transient nausea and one had one episode of vomiting.

Conclusion: In our experience, CNAP™ is a reliable and useful tool for titrating phenylephrine infusion to maintain haemodynamic stability during caesarean section performed under neuraxial anaesthesia.

References
P50 General anaesthesia in the obstetric patient: can we predict who will require it?

RJ Vickers, MS Reddy
Department of Anaesthesia, Queen's Hospital, Burton on Trent, UK

Introduction: Normal labour guidelines in our institution (delivery rate approx. 3500 p.a.) have been updated following publication of NICE intrapartum guidelines.1 They now allow low-risk women who have not received opioids to be offered a light diet during labour unless they develop risk factors for general anaesthesia (described as becoming high-risk during labour). If they become high-risk during labour they would then not be offered further food. We investigated the potential for women receiving general anaesthesia (GA) to have ingested food recently.

Method: We aimed to analyse the records of 50 consecutive obstetric patients receiving GA and establish those who were high risk at booking, those who became high risk before labour and those who were low risk at the start of labour (as per our evidence-based guidelines). Further analysis of this last group would be undertaken to see whether they remained low risk before GA and if they became high risk (e.g. epidural insertion, augmentation of labour, abnormal CTG) or received opioids, how long before the GA they occurred. The indication for operation and GA was also noted in this group.

Results: The notes of 45 patients receiving GA between 07/12/07 and 31/07/08 were analysed. We were unable to locate the notes for 5 patients, 24 patients were high risk at booking and a further 11 became high risk before labour. Therefore 10 patients were low risk at the beginning of labour (therefore the “normal labour guidelines” applied). Nine of these patients became high risk or received opioids during labour. The range of times for this was between 40 min and 21 h before receiving GA. Six patients became high risk less than 6 h before receiving GA. (This is the minimum time interval for lack of food before GA) One patient received GA (patient request) for suturing a perineal tear and therefore did not become high risk during labour. The indications for operation were caesarean section, successful trial of forceps, perineal tear and for GA were time constraint and patient request 2.

Conclusion: Both NICE and our local guidelines indicate that a low risk labouring woman should be allowed to eat a light diet unless she has received opioids or “develops risk factors that make a general anaesthetic more likely”. This latter phrase is difficult to interpret and is generally used to mean at increased risk of needing operative intervention (referred to locally as “becoming high risk during labour”) However, many anaesthetists argue that it is impossible to predict who will require a GA. Our study confirms this position, with an average of nearly one patient per month receiving a GA during the study period having potentially eaten less than 6 h before their GA.

Reference
1. Intrapartum care - Care of Healthy women and their babies during childbirth NICE guideline 55. September 2007.

P51 Infrared foot temperature measurement and assessment of epidural blockade for caesarean section

S Hussain, DG Nicolson, R Baraz, RE Collis
Department of Anaesthetics, University Hospital of Wales, Cardiff, UK

Introduction: A relationship between the upper sensory dermatomal level of an epidural block and foot temperature is recognised.1 We wished to investigate whether the increase in foot temperature after epidural top-up for emergency caesarean section added value as an objective assessment.

Method: After ethical approval and consent this prospective observational study recruited labouring women with a functioning epidural requiring urgent caesarean section. Dermatomal spread was assessed using sensation to ice, motor block by ability to perform a full straight leg raise (SLR) and temperature (°C) by measurements at the plantar and dorsal aspect of each foot by a Precision Gold infrared thermometer. All measurements were taken before and after satisfactory epidural top-up.

Results: 22 women were recruited. After epidural top-up, the average upper dermatomal increase on the right was 7.7 which was associated with an average foot temperature rise of 3.8°C. On the left an upper dermatomal increase of 6.8 was associated with an average rise of 3.7°C.

<table>
<thead>
<tr>
<th>Block level</th>
<th>Right Plantar</th>
<th>Right Dorsal</th>
<th>Left Plantar</th>
<th>Left Dorsal</th>
</tr>
</thead>
<tbody>
<tr>
<td>T°C mean</td>
<td>28±4.3</td>
<td>28±4.2</td>
<td>28±4.1</td>
<td>28±3.8</td>
</tr>
<tr>
<td>Pre±SD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>top - range</td>
<td>22-35</td>
<td>22-34</td>
<td>21-34</td>
<td>22-34</td>
</tr>
<tr>
<td>up Block level</td>
<td>T8 (L2 – T6)</td>
<td>T8 (L2 – T6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Able to SLR</td>
<td>13/22</td>
<td>10/22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post T°C mean±SD</td>
<td>32±2.2</td>
<td>32±2.2</td>
<td>32±2.7</td>
<td>32±2.8</td>
</tr>
<tr>
<td>range</td>
<td>26-36</td>
<td>27-35</td>
<td>30-35</td>
<td>29-37</td>
</tr>
<tr>
<td>top - Block level</td>
<td>T2 (T4 – C4)</td>
<td>T2 (T4 – C4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Able to SLR</td>
<td>0/22</td>
<td>1/22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Block level: upper block level; data are median (range)

Conclusion: On obtaining a block height of T4 or above (suitable for a caesarean section), the average temperature of the feet increased to 32°C. The left foot tended to be slightly warmer than the right possibly because of the left lateral tilt. There was no difference between the plantar and dorsal aspect of the feet. The coolest foot was 29°C in one patient. A very warm foot was highly associated with a suitable block for caesarean section and we feel this very easy measurement could both aid clinicians in block assessment and be a truly objective measurement to document.

Reference
P52 Is general anaesthesia necessary to reduce diagnosis-to-delivery intervals for cord prolapse?
IR Mohamed Iqbal, CH Laxton, D Siassakos,* Z Hasafa,* T Draycott,*
Department of Anaesthesia, Southmead Hospital, Bristol, UK. *Women’s Health, Southmead Hospital, Bristol, UK

Introduction: The benefit of effective team-based simulation training for obstetric emergencies is well established and improves maternal and neonatal outcomes. This study aims to determine whether the introduction of drill training at our unit (6000 deliveries per annum) in 2000 had an effect on diagnosis-to-delivery intervals (DDI) for cord prolapse and whether general anaesthesia (GA) played an important role. We hypothesised that if the DDI is significantly reduced with better teamwork, there may be time for regional anaesthetic techniques.

Method: Retrospective cohort observational data were collected for a 7-year period before (1993-99) and after (2001-07) the introduction of compulsory annual multi-professional obstetric emergencies skills training for all staff. The 30-min cord prolapse skill station involves role play in realistic teams. Data from all women who were delivered by caesarean section for cord prolapse were analysed. Outcome measures included DDI. P<0.05 indicated significance.

Results: 23 women pre- and 17 women post-training required caesarean section for cord prolapse. GA was used for 21 and 14 women, and spinals for 2 (8.7%) and 3 (17.6%) respectively. The DDI interval (min) was significantly reduced by training as shown in the table.

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>DDI (93-99)</th>
<th>DDI (01-07)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>27.5 (9.2)</td>
<td>20.1 (9.3)</td>
<td>0.02**</td>
</tr>
<tr>
<td>GA used</td>
<td>26.7 (9)</td>
<td>18.4 (6.2)</td>
<td>0.003**</td>
</tr>
<tr>
<td>Spinal</td>
<td>36 (9.9)</td>
<td>28 (18.2)</td>
<td></td>
</tr>
</tbody>
</table>

In the post-training cohort, 13/17 women had persistent fetal bradycardia (mean DDI 18.3 min; 2 /13 received spinals, DDI 16 and 19 min). None of these 13 babies had 5-min Apgar scores <8.

Discussion: DDI for cord prolapse were significantly improved after the introduction of annual multi-professional team drill training, regardless of anaesthetic technique. The resultant reduction in DDI allows for greater consideration of the use of rapid-sequence spinal anaesthesia. Prospective studies are needed to assess whether the mode of anaesthesia per se impacts on DDI and fetal outcome.

References

P53 Lessons learnt: a 12-month prospective audit of decision-to-delivery times for class 1 caesarean section
S J A Gold, R Martlew
Anaesthesia, Lancashire Teaching Hospital NHS Foundation Trust, Preston, UK

Introduction: We would like to present our lessons learnt arising from a 12-month prospective audit of decision-to-delivery times at our unit which has 4500 deliveries a year. The recognised standard is decision to delivery within 30 min.

Methods: The notes from all Class-1 caesarean sections from 1.12.07 to 30.11.08 were contemporaneously reviewed. An interim 4-month report revealed the most common cause of delay was the inability to readily open a second theatre. We designed a protocol to improve this and compared the results before and after implementation on 01.06.08.

Results: 115 Class-1 caesarean sections were undertaken during the audit, 50 in the 1st 6 months and 65 in the 2nd. Anaesthesia was provided by spinal in 49, epidural in 26 and general in 40. Decision-to-delivery data is presented below:

<table>
<thead>
<tr>
<th>1st 6 Months</th>
<th>2nd 6 Months</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision to delivery</td>
<td>Mean: 40.9</td>
<td>Mean: 32.2</td>
</tr>
<tr>
<td>Range:12 - 205</td>
<td>Median: 31</td>
<td>Median: 29</td>
</tr>
<tr>
<td>&lt; 30 min</td>
<td>44%</td>
<td>58%</td>
</tr>
<tr>
<td>&lt; 75 min</td>
<td>92%</td>
<td>98%</td>
</tr>
</tbody>
</table>

Discussion: The introduction of a second theatre protocol resulted in some improvements in the audited parameters, the median now complying with the audit standard. However there was no statistical significance, which may be due to insufficent sample size. The benefit of a 30-min target is arguable and it has been shown that a 75-min target is safer for the mother and not significantly detrimental to the fetus. As shown, a 75-min target is more achievable and as a 30-min target may also have legal implications, we feel it is time to consider removing this benchmark. We learnt lessons from our audit and implemented a change that went some way to improving our performance. To improve even more, the key as ever is better communication in all areas.

References
2. Thomas J, Paranjothy S, James D. National cross sectional survey to determine whether the decision to delivery interval is critical in emergency caesarean section. BMJ 2004; 328: 665; 38031.775845.7C.
P54 Measured angle of tilt achieved by an inflatable balloon wedge: is visual assessment a valid predictor?
B S Grewal, I Suri
Anaesthetics, Warwick Hospital, Warwick, UK

Introduction: Many different studies have examined haemodynamic changes at the time of surgery with the use of fixed-tilt wedge devices. Most theatre departments use these for caesarean section to prevent aortocaval compression-induced hypotension. At Warwick Hospital we use an inflatable wedge device to manage this and rely on visual assessment of the recommended 15° tilt. We studied the accuracy of the inflatable device to create a 15° tilt.

Methods: Over the three-month period August to October a prospective audit was performed. After verbal consent of 30 women all booked for caesarean section under spinal anaesthesia, we measured the angles of tilt created when a balloon wedge was inflated under the right side of the patient. Based on the protractor device described by Kinsella2 we assembled our own device and used this to measure the angles of tilt created on the operating table. Other relevant data collected included body mass index (BMI), booking blood pressure, lowest blood pressure recorded during surgery, volume of local anaesthetic used and vasopressor requirement.

Results: The measured angles ranged from 10 to 17.5° and the mean angle measured was 13.6° with a mean difference of -1.35° from the intended tilt angle, a marginal overestimation. This resulted in a standard deviation of 2.06°. BMIs ranged from 16 to 45 kg/m² with a mean of 28.6. The resulting percentage drop in systolic blood pressure ranged from zero to 51%, a mean of 18.7%. Twelve of the 30 women (40%) had a drop ≥20%, 9 (75%) of these had a measured angle of less than 15°. Of the 18 remaining who had a pressure drop <20% only 7 (38%) had a measured angle of less than 15°. Separating the women into three groups purely according to BMI showed a difference in percent pressure drop from a mean of 17.2% for the smaller group to 19.1% for the middle group to 20% for the larger group.

Conclusion: Over the 30 cases the visual estimation of angle required using the inflatable wedge proved accurate in the achievement of near 15° tilt. The standard deviation of 2.06° indicates that 95.4% of cases could achieve within 4.12° of the expected and required 15° tilt, i.e. 11 to 19° tilt (2 SD). With minimal effort it is possible to tilt a patient on the operating table to the required 15° without the need for lifting or turning. The balloon wedge has the added benefit of quick deflation post partum without needing to turn the patient or table again.

References

P55 National survey of obstetric difficult airway guidelines and equipment
A Joseph, J Dedhia, M Mushambi
Anaesthetics, University Hospitals of Leicester, Leicester, UK

Introduction: The incidence of failed intubation in the pregnant population is eight times higher than in the non-pregnant population. In 2004, The Difficult Airway Society (DAS) published unanticipated difficult airway guidelines for the non-pregnant patient. At present, there are no national guidelines for the pregnant patient. The aim of our survey was to evaluate difficult airway guidelines and airway equipment in obstetric units in the UK.1

Method: Questionnaires were sent to lead obstetric anaesthetists in 213 units. Questions included details of difficult airway guidelines, difficult airway equipment on delivery suites and access to simulator training.

Results: 131 replies were received (61% response rate). 53 units had one or more failed intubations per year. Most units (51%) followed DAS or modified DAS guidelines. The rest had either local guidelines or modified guidelines from textbooks. Recommendations such as number of attempts, when to proceed and how to manage the can’t intubate and can’t ventilate (CICV) scenario varied significantly among those who followed local guidelines. Maternal haemorrhage and fetal bradycardia were acceptable reasons to continue surgery in some guidelines but in 49 units, this was not specified. The majority of hospitals were happy to continue anaesthesia using an LMA should surgery be deemed life saving and oxygenation was possible. 48 units did not offer airway simulator training.

Figure: Equipment available (HPJV-high pressure jet ventilation, NBCC, LBCC-narrow & large bore cricothyroid cannula).

Conclusions: Our result shows that there are many unanticipated obstetric difficult airway guidelines with no uniformity. Many hospitals are not fully equipped to cope with the CICV scenario. There is a need for better access to simulator airway training.

Reference
P56 Normal urine output after caesarean section
MJ Mackenzie, SM Yentis, M Woolnough, NA Barrett, MR Johnson
Magill Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK

Introduction: When treating mothers at risk of renal dysfunction after caesarean section, a minimum urine output of 0.5 mL kg\(^{-1}\) h\(^{-1}\) is often used as for non-pregnant women, for despite well-described changes in renal physiology in pregnancy, \(^1\) very few data exist on ‘normal’ urine output after caesarean section. Our aim was to establish a normal range of urine output after elective caesarean section under neuraxial anaesthesia in healthy women.

Methods: With REC approval and informed consent, women with no renal or cardiovascular dysfunction undergoing elective caesarean section were recruited into a prospective observational study. For 24 h from the time of urinary catheterisation we recorded hourly urine output, fluid input (which was unrestricted) and the use of prophylactic oxytocin infusion. Data were compared with Mann-Whitney U-test, with \(P < 0.05\) as significant.

Results: In the 36 women recruited so far, mean ± SD booking BMI was 25 ± 4.9 kg/m\(^2\); median (range) parity was 1 (0-2). Oxytocin infusions were used in eight women for the first 4 h. Median (95% CI) urine output in the first 6 h was 0.7 (0.2-2.1) mL kg\(^{-1}\) h\(^{-1}\) in women with oxytocin infusions and 1.5 (0.6-2.9) mL kg\(^{-1}\) h\(^{-1}\) in those without (\(P = 0.01\)). Urine output for all women at 12 h and 18 h of 1.7 (0.6-5.1) and 1.7 (0.4-4.7) mL kg\(^{-1}\) h\(^{-1}\), respectively (NS for oxytocin/no oxytocin). Median (95% CI) fluid input in 24 h was 5.3 (3.1-7.7) L, while blood loss at caesarean section was 0.4 (0.2-0.7) L in women with oxytocin infusions and 0.3 (0.1-0.3) L in those without (\(P = 0.02\)). No patients needed blood products.

Discussion: We found a wide range of urine output in healthy women after caesarean section, especially > 6 h (where data may be less accurate, since output was measured hourly for 6 h, but after this catheter bags were emptied at various intervals and hourly averages calculated). Oxytocin infusion was associated with a lower urine output; this may be related to its known effect on urine output or to the increased blood loss in this group of women, although the increase in blood loss was small. Our results suggest that an oxytocin infusion should be accounted for when setting a minimum acceptable postoperative urine output in at-risk women.

Reference
PSR Retrospective study of 1602 obstetric intubations: predicting difficult and failed intubation using the Mallampati test

J Thompson, SS O’Neill, L Hutchings, R Jones
Department of Anaesthesia, Royal Berkshire Hospital, Reading, UK

Introduction: Difficulty managing the airway has been identified as a principal contributing factor to anaesthetic-related maternal death. The Mallampati (MP) test is commonly used to assess the airway preoperatively but its accuracy is controversial.

Methods: We analysed a 10-year period (1998-2008) of a district general hospital obstetric database and identified 1602 obstetric patients who underwent tracheal intubation and who had MP and Cormack-Lehane (CL) grade recorded. Sensitivity, specificity and positive predictive value of the MP were determined.

Results: Difficult laryngoscopy (CL Grade III or IV) occurred in 40 patients (2.5%). The MP test had a sensitivity of 22.5% (95% CI 11.4-38.9%), specificity of 95.7% (95% CI 94.6% - 96.6%) and positive predictive value of 11.8% (95% CI 5.9-21.8%) in predicting difficult laryngoscopy (CL Grade III or IV).

<table>
<thead>
<tr>
<th>Mallampati scores</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 895</td>
<td>78</td>
<td>7</td>
<td>2</td>
<td>982</td>
</tr>
<tr>
<td>2 362</td>
<td>160</td>
<td>20</td>
<td>2</td>
<td>544</td>
</tr>
<tr>
<td>3 38</td>
<td>24</td>
<td>6</td>
<td>2</td>
<td>70</td>
</tr>
<tr>
<td>4 3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>1298</td>
<td>264</td>
<td>34</td>
<td>6</td>
<td>1602</td>
</tr>
</tbody>
</table>

There were five failed intubations, three of which were classified as MP Grades 1 or 2 preoperatively.

Conclusion: This represents the largest published study assessing the MP test in the obstetric population. The high specificity of the MP test in identifying difficult intubation and the ease of its application in the emergency situation supports its use. However, in contrast with recent studies, we report both low sensitivity for the MP test in predicting difficult intubation and failure to preoperatively identify subsequently failed intubations. This study is likely to more accurately represent routine obstetric anaesthetic practice in the United Kingdom than previous studies addressing this issue.

References

PS9 Service evaluation of transversus abdominis plane block following caesarean section under subarachnoid anaesthesia with intrathecal diamorphine

B Edwards, E Puddy, I Wrench
Department of Anaesthesia, Jessop Hospital for Women, Sheffield, UK

Introduction: The transversus abdominis plane (TAP) block is a novel regional technique providing analgesia for lower abdominal incisions. A single study has indicated that this technique improves analgesia following caesarean section under subarachnoid block in the absence of long-acting intrathecal opioids. The practice in our unit is to use intrathecal diamorphine in such cases. We wished to establish whether the introduction of TAP block would improve postoperative analgesia for our patients.

Method: The data we present are derived from 20 patients presenting for elective caesarean section. Subarachnoid anaesthesia was performed using 0.5% heavy bupivacaine with the addition of diamorphine 300μg. Bilateral TAP block was performed at the completion of surgery under ultrasound guidance and 0.375% bupivacaine infiltrated to a total dose of 2 mg/kg. All patients received regular NSAIDs and subcutaneous morphine was prescribed as needed. The results were compared with 27 patients from a study with similar anaesthetic management but without TAP block.

Results: The time in minutes (mean ± SD) to first dose of postoperative morphine was 652 ± 397 with and 372 ± 188 without TAP block. (P=0.013; t-test).

Figure: Percentage of patients not requiring morphine after surgery, in the presence or absence of TAP blockade.

Discussion: Our data suggests that TAP blockade significantly improves postoperative analgesia following caesarean section under subarachnoid block, where intrathecal diamorphine has been used.

References
**P60 The accuracy of location of the cricothyroid membrane by the palpation method**

SC Ng, N Salah, N Aslani, N Hayes, C McCaul
Anaesthesia, Rotunda Hospital, Dublin, Ireland

**Introduction:** Accurate identification of the cricothyroid membrane (CTM) is essential prior to cricothyroidotomy. Failure to identify the CTM may result in vascular and airway injury, subcutaneous or paratracheal placement and failure to oxygenate. The accuracy of the traditional method (palpation) in locating the CTM is unknown. We aimed to assess the accuracy of this method. We hypothesized that the degree of inaccuracy would be greater in the pregnant than non-pregnant population.

**Methods:** After ethical approval and informed written consent, 16 female patients (pregnant and non-pregnant) were recruited in a prospective observational trial. The primary outcome measure was distance, either cephalad or caudad, of the estimated from actual CTM which was identified using ultrasound. Doctors were asked to identify the CTM in the supine patient with the head initially neutral and then hyperextended.

**Results:** Doctors identified the CTM accurately in 2/16 vs 3/16, \((P=ns)\) patients in the neutral and hyperextended positions respectively. The mean distance from the actual CTM was 0.9±0.8 vs 1.0±1.1 cm \((P=ns)\) in the neutral and hyperextended positions respectively. The maximum distance from the CTM was 2.5 cm caudad in the neutral and 3.5 cm caudad in the hyperextended positions. There were no differences between the pregnant and non-pregnant populations.

**Conclusions:** Failure to accurately identify the cricothyroid membrane is common. This may lead to misplacement of emergency airway devices, oxygenation failure and tissue injury.

<table>
<thead>
<tr>
<th>Location of nipple</th>
<th>Type &amp; no. of book*</th>
</tr>
</thead>
<tbody>
<tr>
<td>T4</td>
<td>10 (55%)</td>
</tr>
<tr>
<td>Between T4 and T5</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>Between T5 and T6</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>Between T5 and T7</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>Not shown</td>
<td>5 (27%)</td>
</tr>
</tbody>
</table>

**Discussion:** Our findings demonstrate considerable inconsistency between textbooks regarding dermatome maps. This has direct relevance to obstetric anaesthesia since the levels T3-T5 are particularly important for assessing blocks for caesarean section. A recent review of dermatome maps concluded that the evidence base for them is weak and inconsistent, whilst there is considerable variation between individuals in their dermatomal distribution. Combined with the variability in anaesthetists’ knowledge and in their method of assessment of regional blocks, this supports the proposal that the use of dermatomes to describe blocks for regional anaesthesia for caesarean section should be abandoned in favour of marking the height of block on a drawing of the body. Furthermore, textbooks and reviews should refrain from declaring a ‘minimum height of block’ in terms of dermatomes alone, unless the latter are clearly defined. Alternatively, descriptions of surface anatomy (e.g. nipple, upper breast, etc) should be used instead.

**References**
P62 An audit of interventional radiology in the management of obstetric haemorrhage
S Bagchi, J Reidy, K Langford, G O'Sullivan
Anaesthetics, Guy's and St. Thomas' NHS Foundation Trust, London, UK

Introduction: The Royal College of Obstetricians and Gynaecologists and the British Society of Interventional Radiology jointly published a guideline in 2007 urging obstetric units to consider early prophylactic interventional radiology (IR) in the prevention and management of postpartum haemorrhage (PPH). A literature review has suggested that selective arterial embolisation has better success rates and fewer side effects than traditional treatments like uterine tamponade and internal iliac artery ligation. We have audited our institution’s use of IR for obstetric haemorrhage.

Material and Methods: The audited measures included intra-operative haemorrhage and PPH, hysterectomy, specific side effects of IR and maternal and neonatal mortality. Twelve patients were treated between July 2006 and December 2008. In those patients who were known to be at risk of PPH e.g. a morbidly adherent placenta, a five-gauge vascular sheath was introduced into the femoral artery. Occlusion balloons were then placed in the internal iliac arteries under fluoroscopic control. If the patient bled the balloons were inflated, the uterine arteries were selectively catheterised using a Seldinger technique and where possible bleeding vessels were embolised with gelfoam.

Results: Patient details are as follows:

<table>
<thead>
<tr>
<th>Age (Mean)</th>
<th>BMI (Mean)</th>
<th>Gestation (Mean)</th>
<th>Parity</th>
<th>Emerg</th>
<th>Elec</th>
<th>Tran</th>
<th>Sfers</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-40yrs</td>
<td>18-38</td>
<td>31-39</td>
<td>0-5</td>
<td>4</td>
<td>8</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>(31.9)</td>
<td>(32.5)</td>
<td>(35.9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A blood transfusion was needed in six patients (range: 1-18 units). In our elective cases (n=8) where major haemorrhage was anticipated, two patients required hysterectomy. Both of these cases needed massive transfusion and it cannot be said with certainty if IR reduced the blood loss. The only known specific complication of IR was in a patient who required two IR procedures to control haemorrhage. Postoperatively she had a necrotic vaginal discharge for six months followed by amenorrhoea. There is also a defect in her anterior uterine wall and a future pregnancy is possibly contraindicated. There was no maternal or neonatal mortality.

Discussion: In most publications where IR is used to control haemorrhage, the causes of bleeding were adherent placentas or placenta previa. In our series IR was used in a variety of cases some of which (n=3) did not bleed and these patients did not have any IR.

Conclusion: As IR is a relatively new tool in the prevention and treatment of obstetric haemorrhage it is important that its use should be carefully monitored and patients subjected to detailed follow up.

References

P63 Audit of autologous and allogenic blood use in obstetrics
E Powell, N Osborn
Department of Anaesthesia, Heart of England NHS Trust, Birmingham, UK

Introduction: Intra-operative cell salvage (IOCS) is increasingly being used in obstetric practice. 1 In Heartland’s Hospital delivery unit IOCS is used for elective cases at high risk of bleeding and some emergencies in working hours. As yet the IOCS service has not been extended to out-of-hours emergencies. This is due to the number of staff that would need training in cell salvage for it to be available 24 hours and also because of the priority for the ODP to assist the anaesthetist in emergency situations. There are other reports of IOCS being used mainly in elective obstetric cases. However, because of a previous audit in our unit, we felt that it was the emergency cases that would benefit most from IOCS. The first aim of this audit was to look at the cases where cell salvage was used and the number that would have needed allogenic blood otherwise. The second aim was to look at the patients requiring caesarean sections that were transfused allogenic blood, i.e. the cases we ‘missed’.

Methods: We collected data for each case of IOCS from May to December 2008. From the postoperative Hb and the volume and haematocrit of autologous blood transfused, we calculated the number of cases that would have required allogenic blood with a transfusion trigger of <8 g/dL. We then looked retrospectively at all patients who had caesarean sections from the same time period to see how many were transfused and why IOCS was not used.

Results: IOCS was used for 34 cases of which 28 were elective (82%). 12 cases were transfused with autologous blood. Two cases would have had a postoperative Hb of <8g/dL if they had not received autologous blood. A further 2 cases that received allogenic blood also received 759 mL and 528 mL of autologous blood. There were 20 patients who had caesarean sections who received allogenic transfusion (total of 57 units at a cost of £7964.04) for whom IOCS was not used. Of these 80% (16) were emergency cases.

Conclusions: There are training and staffing difficulties with using cell salvage in emergency situations, but it is these cases that will benefit the most from its use.

References
P64 Haemodynamic effects of a bolus or infusion of oxytocin: a randomised double-blind trial
E Van den Enden, J Lahousse, R Devlieger, E Vandermeersch, M Van de Velde

Introduction: Intravenous oxytocin given immediately after birth during caesarean section prevents uterine atony and reduces blood loss. However, an i.v. bolus might cause serious maternal haemodynamic adverse effects. This double-blind randomised trial compared the efficacy and maternal side-effects of an i.v. bolus of OXY with a slow i.v. infusion.

Methodology: Following institutional ethics committee approval and written informed consent, 40 patients undergoing elective caesarean section were randomised to receive 10 units of i.v. oxytocin either as a bolus (B-group) or as a slow infusion (I-group). All caesarean sections were performed under combined spinal-epidural anaesthesia and oxytocin administration was started following delivery of the fetal head. Maternal haemodynamics and blood loss and other complications were recorded. Data were analyzed using χ² analysis and repeated measures ANOVA with appropriate post hoc testing.

Results: Demographic data were similar between groups except for a longer duration of pregnancy in the I-group (39.3±0.8 versus 38.4±1.3 weeks in the B-group, P<0.05). Bolus oxytocin administration resulted in more pronounced, but short-lived, hypotension. In the B-group more patients (15 vs 8, P<0.05) experienced a decrease in mean blood pressure of >20%. The lowest recorded mean blood pressure was lower in the B-group (54±12 vs 64±9 mmHg in the I-group, P<0.05). No difference in estimated blood loss was observed. Haemoglobin levels were similar between the groups at 3 h and two days postpartum.

Discussion: The results of the present study indicate that a 10-unit bolus of oxytocin has short-lived and (in a healthy patient population) well-tolerated haemodynamic side-effects. Since bolus oxytocin did not confer a benefit in terms of blood loss postpartum, we advice against bolus administration of oxytocin. This is in agreement with current scientific knowledge and expert opinion.

Reference

P65 Haemorrhage after vaginal delivery: a 12-year retrospective survey
S Quaglia, A Morra, A Zito, C Pasqualini, M Demichela,† E Gollo
Department of Anaesthesia, Sant’Anna Hospital, Turin, Italy, *Department of Obstetrics and Gynaecology, Sant’Anna Hospital, Turin, Italy, †DISMIC, Politecnico di Torino, Turin, Italy

Introduction: Postpartum haemorrhage is an important cause of maternal death, accounting for nearly one quarter of all maternal deaths worldwide. It is also a significant cause of maternal morbidity.

Method: Sant’Anna Hospital of Turin (Italy) had 66 947 vaginal deliveries from Jan 1997 to Dec 2008. We carried out a retrospective analysis of all vaginal deliveries over the last 12 years where there was post-partum blood loss >1500 mL requiring surgical (hysterectomy) and/or medical intervention and admission in the intensive therapy unit (ITU). The data were subdivided into three-yearly intervals. A χ² test for trend was used for statistical analysis.

Results: Major haemorrhage after vaginal delivery: An increasing trend may be observed over the last 12 years. An χ² test for trend revealed this increasing trend to be not statistically significant (P=0.059). Hysterectomy after vaginal delivery: An increasing trend was observed from 1995 to 2005 followed by a decrease over the last 3 years. A χ² test for trend revealed this decrease to be not statistically significant (P=0.16). One woman died from uterine rupture (previous caesarean section) at 26 weeks in 2001: she died 36 h after delivery.

Conclusion: Major haemorrhage after vaginal delivery appears to have slightly, but not significantly, increased over the last 12 years in Sant’Anna Hospital of Turin. The rise in haemorrhagic risk factors in women giving birth at Sant’Anna Hospital is likely to have contributed to this. Early detection of antepartum risk factors in order to implement preventive measures, proper training of obstetric staff and the adoption of the hospital protocols from 2003-05, immediately available resources to manage haemorrhagic emergencies in the operative area of labour and delivery units, and less radical surgical options may have contributed to decreasing, albeit not significantly at present, hysterectomies after vaginal delivery over the last 3 years and to having no maternal mortality after 2001. Over the next few years we will observe whether these trends are confirmed.

Reference
P66 Implementing cell salvage for non-emergency caesarean sections

C Ralph, J Faulds, I Sullivan,*
Anaesthesia, Royal Cornwall Hospital, Truro, UK,
*Haematology, Royal Cornwall Hospital, Truro, UK

Introduction: Our aim is to reduce obstetric donor blood transfusion (1.2%) and offer re-transfusion of cell saved blood to women at risk of haemorrhage. Cell salvage is not routinely offered in obstetrics because of the perceived risks of amniotic fluid embolus and fetal red blood cell (rbc) sensitisation. Implementation may require additional staffing or training. We have demonstrated blood from the cell saver is safe to re-transfuse through a leucodepletion filter.1 Following ethics approval (Dec 07) we introduced cell salvage to all women having elective caesarean sections.

Method: At pre-assessment women listed for elective caesarean section are asked to consent to collection of blood and given written information regarding the study. The cell saver is set up by the anaesthetic service practitioner (ASP) who will have had a supervised training session with the blood conservation co-ordinator (JF). One suction device is used for all amniotic fluid and blood. 1 If adequate volumes of blood are collected it is processed. In recovery, the vital signs and haemoglobin (by HemoCue) will inform the discussion and consent for re-transfusion. Blood is transfused through a leucodepletion filter.

Three and six months post partum, patients return for a blood test to screen for antibodies. Any positive screens are investigated further (IS).

Results: 19 women have consented and had a re-transfusion. Mean post-op (pre-transfusion) haemoglobin: 9.7 g/dL (range 8.2-11.5). Mean volume of blood transfused: 322 mL (range 150-650 mL). No complications of transfusion were observed. 14 women have attended 3-month follow-up and 11 at 6 months. All blood tests have so far been negative. Of the 19 cases, two required allogeneic transfusion in addition to cell saver blood. Five women had two units requested returned unused.

Discussion: Not all ASPs covering Obstetrics feel competent to manage cell salvage. Many who have used it electively feel able to use it an emergency. Training is enthusiastically led by JF, but has not required any other increase in resources. Although fetal rbc are present in the final product, we are uncertain if this results in an increased risk of sensitisation.2 In conclusion: cell salvage used for women undergoing elective section appears safe and can reduce the requirement for allogeneic blood transfusion.

References


P67 Interventional radiology for uterine bleeding

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Introduction: Image guided interventional techniques to prevent or treat postpartum haemorrhage (PPH) are on the increase.1,2 The Royal College of Obstetricians and Gynaecologists has recently urged obstetric units to consider them ‘as an important tool in the prevention and management of PPH’.3 Implementing such services can be challenging for a variety of reasons. Over the last three years we have undertaken six cases. We present our experiences here as a summary.

Cases: In the four elective cases, each woman had a lumbar epidural catheter placed before internal iliac intrarterial balloon catheters were inserted in the interventional suite. They then received general anaesthesia for caesarean section and were observed postoperatively on the high dependency unit. There was a great variability in estimated blood loss and use of balloons. The two emergency cases presented quite a different challenge. In one case a balloon was inflated within the aorta, when urgently placed common iliac balloons failed to control haemorrhage. This allowed selective internal iliac artery catheterisation and embolization. In the second case the patient had already undergone hysterectomy and suffered an EMD arrest before radiological intervention was requested.

Discussion: Although there is no high level evidence that interventional radiology reduces blood loss or prevents hysterectomy, a number of case reports and increasing experience suggest that it may be a useful method.2,3 For elective caesarean sections, its use will inevitably influence anaesthetic management as once the arterial balloons are inserted, positioning the patient for a regional block may be hazardous. Placement of an epidural or intrathecal catheter first would appear the only logical way to achieve neuraxial anaesthesia. Finding a facility that meets the requirements of obstetricians, anaesthetists, radiologists, midwives and paediatricians can be very difficult. With a potentially unstable and actively bleeding patient, transfer to a suitable screening site may not be ideal and the radiologist might have to work ‘in the dark’ with portable equipment that does not have the resolution of a fixed facility. Our impression was that inflation of the balloons alone did not reliably halt bleeding from the placental bed. Collateral blood supplies to the uterus and ‘bleed back’ from distal arteries required further intervention. Embolization when necessary was effective and in at least one case life saving.

References

Interventional radiology in the management of obstetric haemorrhage: an OAA survey of UK maternity units

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Introduction: Massive obstetric haemorrhage is an important cause of maternal mortality.1 Intra-arterial balloon tamponade can prevent or treat life-threatening haemorrhage.2 We conducted an OAA endorsed national survey to determine the availability of Interventional Radiology (IR) for the treatment of obstetric haemorrhage in the UK.

Methods: After successful application to the OAA audit subcommittee, a postal questionnaire was sent to the lead obstetric anaesthetist clinician in 226 UK maternity units. Recipients were asked to respond to questions including whether IR was available, if they had used it in the prevention or management of maternal haemorrhage and to list factors that limited its availability.

Results: Of the 224 units surveyed, 162 replied, yielding a response rate of 72%. Of the respondents 51 units (31%) had used IR for the management of obstetric haemorrhage in the preceding 3 years whilst 37 (23%) had no experience of IR. Seventy four (46%) had considered using IR and a majority of these, 46 (62%), had experienced problems with availability. The reasons for these problems are summarised below.

<table>
<thead>
<tr>
<th>Lack of equipment</th>
<th>4 (9%)</th>
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<tbody>
<tr>
<td>Lack of personnel</td>
<td>13 (28%)</td>
</tr>
<tr>
<td>Out of hours</td>
<td>7 (15%)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (4%)</td>
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<tr>
<td>Multiple reasons</td>
<td>20 (44%)</td>
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Specialised vascular radiologists were accessible in 94 (58%) of centres, however in 43 (45%) of these units their availability was variable. In 69% of units where IR was available, respondents estimated that it would take >30 min for relevant equipment to become available. Patients had been transferred out to receive IR from a minority of units, 18 (11%), and only two centres had done this on more than three occasions.

Conclusions: Our survey demonstrates that experience of IR in the prevention or control of maternal haemorrhage is limited to a minority of UK obstetric anaesthetia units. Access to this potentially life-saving resource is subject to striking local variability.

References

Jehovah’s Witnesses: a six-year experience in a tertiary obstetric unit

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Introduction: There is relatively little published about the outcomes of patients who are Jehovah’s Witnesses (JW). Previous studies suggest a 35-44-fold increased risk of maternal death.1,2 In CEMACH 2003-2005, two women who died from haemorrhage had declined blood transfusion due to their religious beliefs. Clear documentation of JW wishes is essential. We sought to establish the efficacy of documentation, obstetric and anaesthetic outcomes including post-partum haemorrhage (PPH).

Method: We identified 52 women from our maternity database CMS from 2003 to 2008. We analysed the notes using a proforma to record: basic obstetric demographics; booking haemoglobin (Hb); pre-optimisation; documented records showing acceptance/refusal of blood fractions; factor 7, cell salvage, acceptance of death rather than accept blood; advanced directive in notes; type of delivery; type of anaesthetic; duration of labour; estimated blood loss (EBL); uterotonic use; post-delivery Hb.

Results: The mean age of our cohort was 28.3 years. 18/52 were primips and 6/52 had parity>3. 33/52 were seen in the anaesthetic clinic at a mean gestational age of 30/40. 51/52 had a booking Hb with a mean Hb of 11.9 g/dL. 18/52 women stated they were Jehovah’s Witnesses not. 20/52 had an advanced directive filed in the notes. Documented acceptance to various interventions: blood fractions 9/52; factor VII 16/52; haemodilution 14/52; cell salvage 21/52. 11/52 had a documented discussion about death: 8 stated they would rather die (one had previously accepted blood) and 3 stated they would accept blood as a last resort. Mode of delivery: 36/52 normal; 7/52 instrumental in theatre; 5/52 emergency caesarean section; 2/52 instrumental in room; one unplanned home birth; one scheduled caesarean section. 1/52 had manual removal of placenta and 2/52 had 3rd degree tears. 20/52 had anaesthetic involvement with either a spinal or epidural. 1/52 had a PPH of 2500 mL otherwise mean EBL was 316 mL. All patients had an active 3rd stage. 18/52 had a Syntocinon infusion (including all who had an EBL ≥500 mL). 23/52 had a post-partum Hb measured: mean Hb 11.1 g/dL. The lowest Hb was the PPH woman whose Hb dropped from 13.2 to 8.1 g/dL.

Discussion: Most deliveries were uneventful. The PPH rate in this cohort was 1/52 (2%) and EBL was limited by oxytocics and a low threshold for Syntocinon infusion. There was no significant drop in Hb during delivery. Caesarean section rate was 11.5%. Anaesthetic input was present in 38% of cases. Introduction of a dedicated JW proforma has improved our documentation. There was no serious morbidity in this cohort.

References
P70 Management of 69 consecutive cases of suspected placenta accreta

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Background: Placenta accreta can only be confirmed at surgery. The study aimed to identify risk factors for placenta accreta and to report peri-operative outcomes among patients suspected of placenta accreta.

Methods: Data on consecutive cases of placenta accreta were collected prospectively from 2002-2008, with waiver of IRB approval. Ultrasound signs and obstetric history caused suspicion of accreta (graded low or high suspicion). Diagnosis was confirmed at surgery. Logistic regression analysis was used to identify factors associated with placenta accreta diagnosed at surgery.

Statistical analysis: Data analyzed using SPSS 14.0 (SPSS Inc. Chicago, Illinois). A two-sample t-test was used for parametric variables, χ² for non-parametric discrete variables and a logistic regression model using relevant variables, P <0.05 was considered significant.

Results: Sixty-nine cases of suspected placenta accreta were identified (low suspicion: 23, high suspicion: 46). Thirty-eight women were positively diagnosed with placenta accreta at surgery; 33/46 (72%) high and 5/23 (22%) low suspicion (P <0.001). Suspicous ultrasound signs P=0.001 (OR 9.5, 95% CI 2.6-34.4), existence of placenta previa P=0.005 (OR 9.8, 95% CI 2.0-47.6) and multiple previous cesarean sections P=0.015 (OR 5.7, 95% CI 1.4-22.7) were significantly associated with a positive diagnosis at surgery from among the cases of suspected of placenta accreta. Patients with accreta had more hysterectomies, 32/38, 86% versus 2/31, 7% than those without accreta, P=<0.001, more transfused blood, 7.3±5.5 units versus 1.0±1.8, P=<0.001, longer ICU stay 24±22 h vs 0, P=<0.001, longer hospital stay 8.9±3.7d vs 5.4±1.4, P=0.009 and more postoperative complications, P=0.006. Massive blood transfusion requirement (≥8 PC) was found among patients who had hysterectomy, P= 0.002 (OR 35.7 95% CI 3.6-333.3), but use of iliac vessel loops for controlling hemorrhage, and high suspicion of accreta were not significant factors for predicting blood transfusion requirements in the logistic regression model.

Conclusion: One in five patients deemed low suspicion had a confirmed accreta. Accreta frequently required cesarean hysterectomy, which is associated with significant morbidity even among women with high pre-delivery suspicion for placenta accreta.

Reference


P71 Maternal haemodynamics at elective caesarean section following oxytocin 5-unit bolus and placebo infusion compared to oxytocin 5-unit bolus and 30-unit infusion

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Introduction: Postpartum haemorrhage (PPH), principally due to uterine atony, remains the most common cause of direct maternal death worldwide1. Both the Seventh Report on Confidential Enquiries into Maternal Deaths in the United Kingdom (CEMACH) from 2003 – 2005 and the United Kingdom Obstetric Surveillance System (UKOSS), 2007, have shown that obstetric haemorrhage is a major cause of maternal morbidity and mortality. However, to date, the risks and benefits of oxytocin when given slowly as a bolus and continued as an infusion have not been fully investigated. Therefore the aim of the study was to compare blood loss and maternal haemodynamics at elective caesarean section following administration of oxytocin 5-unit bolus and placebo infusion compared to oxytocin 5-unit bolus and oxytocin 30-unit infusion.

Methods: This was an observational clinical study within a randomised controlled trial (RCT). Women booked for elective caesarean section were recruited and randomised to either oxytocin 5-unit bolus and placebo infusion or oxytocin 5-unit bolus and oxytocin 30-unit infusion. Non-invasive haemodynamic monitoring before, during and for 4 h after surgery consisted of ECG, oxygen saturation, blood pressure (systolic and diastolic), heart rate (HR) and thoracic bioimpedance monitoring of cardiac index (CI), left ventricular work index (LVWi) and systemic vascular resistance index (SVRI).

Results: A total of 115 women were randomised to the RCT and 74 agreed to haemodynamic measurement. Heart rate, systolic and diastolic BP, CI, LCWi and SVRi all fell following the onset of spinal anaesthesia and, with the exception of SVRi, continued to decrease throughout surgery. After delivery of the fetus, slow injection of Syntocinon 5 units was associated with a temporary rise in CI, LCWi and heart rate, a decrease in SVRi and no change in systolic or diastolic BP. Thereafter, haemodynamic measures slowly returned to normal over 60 min with no adverse effects apparent from the additional oxytocin infusion.

Reference

P72 Post-partum haemorrhage admissions to critical care: completing the audit cycle
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Introduction: Post-partum haemorrhage (PPH) remains a common cause of obstetric admissions to critical care in the UK. Our audit (May 2004-May 2006) found an association with carboprost (Haemobate™) and pulmonary oedema in PPH patients admitted to ITU. Following this, our entire major obstetric haemorrhage guidelines were revised through multi-disciplinary meetings (obstetricians, anaesthetists, haematologists, porters). Changes included revising the algorithm for uterotonic use, restricting carboprost, removing the need for intrauterine tamponade balloons. The maternity database was used for denominator figures and pharmacy ordering data on total carboprost used within the department. The results were compared with the previous audit.

Results: Seven patients were admitted to ICU for PPH compared with 12 in the previous audit. With an increase in the number of deliveries, 12,160 vs 10,713, this is an absolute reduction of 15.8%. The main cause of PPH was uterine atony in four patients (57%). Our use of carboprost fell by 19.5% (pharmacy costs) and although three patients (43%) developed pulmonary oedema, only one received carboprost and the dose did not exceed the maximum in the new guidelines. Our hysterectomy rate fell (14% vs 35%) and 43% of patients were managed with an intrauterine balloon compared with 29% previously.

Conclusions: Revision of our major obstetric haemorrhage guidelines has resulted in a fall in critical care admissions following PPH. Pulmonary oedema due to excessive carboprost use did not occur and our hysterectomy rate also fell. Multiple changes occurred after the initial audit, after deficiencies were highlighted through route-cause analysis, but we feel that early return to theatre, early use of ergotamine and restricting carboprost, increasing the use of uterine balloon tamponades and early use of clotting factors (prior to clotting results) are all important.

References

P73 Prophylactic uterine artery balloon catheters for suspected placenta accreta
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Introduction: We describe a series of women at high risk of postpartum haemorrhage who underwent prophylactic insertion of uterine artery balloon catheters before elective caesarean section.

Method: The records of 14 women who underwent prophylactic insertion of bilateral uterine artery balloon catheters before caesarean section between March 2004 and January 2008 were examined. All but one were high risk for placenta accreta. One woman had significant uterine fibroids. All women received a spinal catheter and 13 also had an epidural catheter sited before transfer to the imaging suite. To facilitate femoral sheath insertion and subsequent balloon catheter placement a T12 sensory block was obtained. With the balloon catheters in situ the women were transferred back to the obstetric theatre for block extension and caesarean section. The balloons were inflated after cord clamping in 13 women, and were left deflated in one because there was little bleeding.

Results: Five women were transfused between 1 and 4 units of blood and two required <500 mL from the cell saver. There were no hysterectomies or additional surgical measures. One required gelfoam embolisation of the uterine arteries to secure haemostasis. One developed a groin haematoma. There were two serious fetal bradycardias in the imaging suite. Both women were transferred rapidly back to the obstetric theatre for block extension and caesarean section. Baby one had a pH of 6.9 and a 5-min Apgar score of 5, and was admitted to the neonatal unit. Baby two had a pH of 7.009 and a 5-min Apgar score of 9. All 14 women and their babies were discharged home well.

Discussion: Genuinely morbidly adherent placentae are difficult to identify with certainty from antenatal imaging. Almost certainly some balloon catheters were unnecessary but this was only clear retrospectively. Transfusion requirements in this high-risk group were small and surgical strategies to control haemorrhage were not needed, nor were subsequent surgical procedures. Maternal morbidity was limited to a haematoma. The two fetal incidents were life-threatening and probably resulted from uterine artery spasm; the distance between the imaging and delivery suits complicated management.
P74 Use of cell salvage during caesarean section in patients with placenta praevia

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Background: Haemorrhage is a major cause of maternal mortality. Allogenic blood transfusion carries risks and supply of blood is limited. Intra-operative cell salvage may be more effective and useful in obstetrics. This is endorsed by CEMACH, OAA/AAGBI Guidelines, the National Blood Service and NICE.

Methods: We retrospectively analysed the cases of placenta praevia among women who received blood products at our institution, a large high-volume centre, from 2004 to 2008. We compared the amount of blood products received by those patients in whom cell salvage was used with those in whom it was not used.

Results: There were 138 cases of placenta praevia between 2004 and 2008, 88 elective and 50 emergency. Out of these only 50 patients (36.2%) had cell salvage in theatre. Among these patients, in 12 (24%) the volume was sufficient for autologous transfusion. The median volume of salvaged blood transfused was 1000 mL, up to a maximum of 3030 mL. Eight patients (16%) received allogenic blood and two received both autologous and allogenic blood transfusion. Six (12%) received only allogenic blood transfusion. No complications leading to poor maternal outcome were directly attributed to the use of cell salvage.

We compared these results with those of 50 patients with placenta praevia who underwent caesarean section during the same time period, but without cell salvage. Twelve of them (24%) needed laboratory blood products.

Conclusion: Use of cell salvage was low during caesarean section in patients with placenta praevia, but resulted in a decrease (50%) in the need for allogenic blood transfusion and is safe. We recommend that cell salvage is used routinely in the management of placenta praevia.

Reference

P75 Caesarean hysterectomy in a patient with severe mitral stenosis and placenta accreta: a case report

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Introduction: Severe mitral stenosis significantly increases the risk of complications in the peripartum period. In addition, placenta accreta and caesarean hysterectomy are often associated with massive blood loss. We present a case of severe mitral stenosis requiring caesarean hysterectomy for placenta accreta at 36 weeks without major complications.

Case report: A 31-year-old with two previous caesarean deliveries presented in her third pregnancy at 21 weeks of gestation with severe shortness of breath (NYHA 4) secondary to previously undiagnosed severe mitral stenosis (valve area 0.8 cm2). The patient underwent successful balloon valvuloplasty at 22 weeks, with good functional improvement despite a new mitral valve area of only 1.2 cm2 and persistently high pulmonary artery pressures (70 mmHg). At 34 weeks, ultrasound scan showed probable placenta accreta with possible bladder invasion, and elective caesarean section was booked for 36 weeks. Following insertion of internal iliac artery balloon catheters and full invasive monitoring (including systemic vascular resistance [SVR] and cardiac output [CO] using LiDCO), anaesthesia was instituted using sequential low-dose CSE. SVR and CO were tightly controlled using a titrated phenylephrine infusion. Surgery was performed in a cardiothoracic theatre with two consultant obstetricians and a urogynaecologist in attendance. Following delivery of a healthy male infant, placenta accreta was confirmed and surgery proceeded to hysterectomy. Initial massive blood loss was attenuated by inflation of the iliac artery balloons and cardiovascular parameters were closely maintained using i.v. fluid replacement and vasopressor. Surgical time was 2 h with an estimated blood loss of 4.0 L. The patient was conscious and comfortable throughout and no i.v. supplementation was required. Following transfer to the cardiac intensive care unit, LiDCO monitoring was continued for 12 h. The patient had an uneventful recovery, and was discharged home on day 4.

Discussion: The rare combination of severe mitral stenosis with placenta accreta results in challenging obstetric and anaesthetic management, given the high risk of peripartum complications. We have demonstrated that these patients can be successfully delivered using a regional technique, provided strict attention is given to maintaining cardiovascular parameters. Benefits of this technique, beyond patient preference, include the ability to optimise preload, afterload, rate and rhythm, reduce the impact of uterine autotransfusion and minimise pulmonary hypertensive complications.

Reference
P76 Caeasarean section in a patient with mediastinal B-cell lymphoma and haemophilia A

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Introduction: B-cell lymphoma is one of a group of malignant cancers that originate in the lymphatic system. Although sometimes asymptomatic, the mass effect of large, fast-growing tumours in the chest may cause great vessel or large airway obstruction. Haemophilia A is an X-linked coagulation disorder that can rarely cause symptomatic bleeding in female sufferers.1 We present a case of a haemophilia A carrier who presented in the third trimester with a large anterior mediastinal B-cell lymphoma requiring caesarean delivery.

Case report: A 38-year-old para 2 woman was booked into our institution for care during pregnancy. She was previously diagnosed as a haemophilia-A carrier, but early third trimester coagulation tests showed pregnancy-related improved Factor VIII levels of 0.76 units/mL (76% of normal) and the plan was at this stage for a normal term delivery. However, she was admitted at 26 weeks of gestation with severe pleuritic chest pain and dyspnoea. CT imaging revealed an 11-cm anterior mediastinal mass, which was diagnosed on biopsy at 28 weeks as a high-grade progressive B-cell lymphoma. Treatment depended on chemotherapy and bone marrow transplantation, but in order to allow greater fetal maturity, a decision was made to deliver at 32 weeks by caesarean section. At this time she had moderate dyspnoea on lying flat and engorgement of chest wall and neck veins, indicating some degree of continued superior vena caval obstruction. The Factor VIII level remained unchanged and after discussion with specialist haematology it was decided that regional anaesthesia remained appropriate. Subsequently spinal anaesthesia was induced, with careful titration of blood pressure with phenylephrine infusion so as to maintain preload. A live baby girl was delivered and the procedure was completed with an overall blood loss of 750 mL. The patient was positioned slightly head up throughout and generally tolerated anaesthesia well, with no deterioration in respiratory symptoms. There were no bleeding problems in the postoperative period. On discharge from the delivery suite she underwent chemotherapy and auto-bone marrow transplantation and has made a good initial response.

Discussion: Factor VIII levels normally increase by 200-500% in pregnancy, so even in those rare cases where symptomatic haemophilia-A carriers require operative delivery, regional anaesthesia may, as in our case, be possible without clotted factor replacement. The presentation of high-grade B-cell lymphoma is fortunately rare in pregnancy, but when it occurs there is a need to balance the need for maternal treatment with fetal well-being. As we have demonstrated, regional anaesthesia is not contraindicated by the presence of large mediastinal tumours, even in the presence of large airway and great vessel compression.

Reference
P78 Case report: severe mitral stenosis diagnosed on the second post-operative day following elective CS

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Introduction: The most recent CEMACH report listed a new ‘top ten’ recommendations. The guidelines reflect the wider social and public health determinants of maternal health. Recommendations include:
- Maternity services should make provision for women who do not speak English
- Women should ‘book’ before completing their 12th week
- All pregnant mothers from countries where women experience poorer overall general health require a full medical examination.

Case report: A 22-year-old primigravida moved to the UK from Pakistan during this pregnancy. She was unable to speak any English and used family as translators. She booked in the 13th week of pregnancy. Her BMI was 20.5 kg/m². She was next seen in hospital in her 37th week. Breech presentation was diagnosed and an ECV was planned. She was assessed by an anaesthetic SpR in Hindi and Urdu. She did not report any relevant medical history. No physical examination was performed. ECV was unsuccessful and so an elective caesarean sectuin was planned.

The patient’s sister-in-law (a hospital interpreter) accompanied her in theatre. No physical examination was performed. She received spinal anaesthesia with a phenylephrine infusion. There were no problems. On the second postoperative day she became short of breath. A medical review elicited a history of increasing shortness of breath and an audible S4. Chest x-ray showed small pleural effusions. An echocardiogram showed severe mitral stenosis (mitral valve area 0.9 cm², peak gradient 15 mmHg), severe left atrial dilatation, raised peak pulmonary artery pressure (56 mmHg), impaired left ventricular function and pleural and pericardial effusions. She was prescribed an ACE inhibitor and furosemide, which improved her shortness of breath. She is currently awaiting further review and will probably be referred for cardiothoracic surgery.

Discussion: This patient had at least two reasons to be high risk: Recent immigrant, no English spoken, late (ish) booker. Several opportunities were missed for clinical examination. Fortunately she had her caesarean section first thing in the morning, minimising dehydration, and did not have any other complications. This case has highlighted the importance of the social factors that can place a parturient at higher risk.

Reference

P79 Intravenous nitroglycerin for uterine inversion: successful management of four cases and a literature review

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Introduction: Uterine inversion is a rare cause of postpartum hemorrhage in which the uterine fundus inverts through the cervix into the vagina. Early replacement of the uterus is the best treatment, but uterine contraction prevents us using this maneuver. So, prompt uterine relaxation is needed in these cases. Three recent case reports suggest that nitroglycerin (NTG) may provide acute uterine relaxation without dangerous side effects in emergent situations like uterine inversion.1,2,3 Case 1: The obstetrician diagnosed uterine inversion and tried to replace it by hand. After his unsuccessful attempt, we administered intravenously 200 micrograms NTG. Uterine relaxation was achieved in two minutes but it was not sufficient, so we gave additional intravenous 200 micrograms NTG and mask sevoflurane. Uterine relaxation was achieved and manual replacement was carried out successfully. As soon as uterus was replaced in its normal position. Total blood loss was 1666 grams. Case 2: When the obstetrician diagnosed uterine inversion, he gave NTG on the delivery bed. Uterine relaxation occurred within 2 minutes and manual replacement was carried out successfully. Total blood loss was 593 grams. Case 3: The obstetrician diagnosed uterine inversion, we gave NTG. Uterine relaxation was obtained within 2 minutes and manual replacement was carried out successfully. Total blood loss was 1100 grams. Case 4: The patient who was diagnosed uterine inversion was taken to our hospital. As soon as the patient arrived, we gave NTG. We couldn’t get enough uterine relaxation. So we used mask sevoflurane with NTG. Uterus was relaxed within 5 minutes, and manual replacement was carried out successfully. Total blood loss was 1900 grams. The patient needed 2 units of red blood cell and 6 units of fresh frozen plasma.

Discussion: For treatment of uterine inversion, the diagnosis is thought to be very important, because if the time from event to replacement is short, blood loss is minimal. However, uterine inversion is a rare condition and difficult to diagnose quickly. We would like to emphasize that obstetricians and anesthesiologists should have the knowledge of rapid tocolysis for the treatment of uterine inversion. Mini-dose nitroglycerin can provide uterine relaxation safely. Side effects such as severe maternal hypotension and prolonged uterine relaxation were not observed in our cases. NTG is an effective tocolytic agent with minimal complications, rapid onset, and a brief half-life. The use of intravenous NTG may be an alternative to general anesthesia in cases of uterine inversion.

References
P80 Management of acute dissecting thoracic aortic aneurysm in full term pregnancy: a case report

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Introduction: Acute aortic dissection during pregnancy in women without Marfan’s syndrome is an extremely rare condition that represents a lethal risk to mother and fetus. We present a case in which emergency caesarean section, repair of dissecting thoracic aortic aneurysm and root replacement were performed as a combined procedure at 38 weeks of gestation.

Case report: A 35-year-old woman, 38 weeks pregnant and previously healthy, presented to the A&E with severe chest pain radiating to the throat and back associated with nausea and vomiting. Labour pains were ruled out after obstetric examination. She was mildly acidic with a blood pressure of 140/94 mmHg in the right arm and 136/41 mmHg in the left. Chest X-ray showed a widened mediastinum and MR scan showed a type-A Aortic Aneurysm involving both renal arteries extending distally to obliterate both the iliac arteries. She was transferred to the cardiothoracic centre for further management, with labetalol infusion and invasive arterial monitoring. She was accompanied by an anaesthetist, an obstetric surgeon and nurse and a paediatric nurse. A central venous catheter, pulmonary artery catheter introducer and two large-bore peripheral cannulae were inserted under local anaesthesia. Metabolic acidosis worsened due to bilateral leg ischaemia. After cardiothoracic, obstetric, neonatal and anaesthetic review, a decision was taken to perform an emergency caesarean section followed by aortic root and arch replacement via a median sternotomy using a standard cardiac bypass technique with full anticoagulation. The procedure lasted 12 h. Caesarean section was performed first after rapid sequence induction and a male child was delivered with a low Apgar score. He required intubation and ventilation in the neonatal intensive care unit, was extubated successfully the next day and is thriving well. After optimization of physiological parameters in the intensive care unit, the mother was extubated the same day. She required intermittent non-invasive continuous positive airway pressure for a few days and was monitored closely for any evidence of bleeding or deteriorating renal functions. Morphine patient-controlled analgesia was used for pain relief. The patient was discharged from the hospital in satisfactory condition on the 8th postoperative day with advice to attend the cardiology clinic.

Discussion: A full term pregnant patient with a dissecting aortic aneurysm presents a challenge for anesthetists, obstetricians and cardiovascular surgeons; early diagnosis and good communication are crucial.1 Caesarean section with concomitant aortic repair is recommended for women in late pregnancy with a type-A dissection and worsening maternal and fetal status.

Reference

P81 Management of multiple caesarean sections in a parturient with Conradi Hunermann syndrome

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Introduction: Conradi Hunnermann Syndrome is a rare genetic disorder associated with abnormal accumulation of calcium within cartilages, epiphysis and other tissues. It can present with short stature, scoliosis, tracheal stenosis, cataracts and/or midfacial hypoplasia.

Case report: first pregnancy. A 20-year-old woman (G8,P0) diagnosed with Conradi Hunnemann syndrome, presented to the labour ward with abdominal pain. She was 32 weeks pregnant and had failed to attend several anaesthetic assessment clinic appointments. On examination she was 1.29 m tall, had severe kyphoscoliosis and a scar foramen magnum extending to the body of C2, and an upper cervical syrinx. After discussion with obstetric colleagues, it was decided that an elective caesarean section was the safest choice. Risks associated with general and regional anaesthesia with a plan for elective and emergency surgery were discussed with the patient. The patient refused to undergo awake fibreoptic intubation and opted for regional anaesthesia despite potential risks for increased herniation of cerebellum. At 36 weeks elective caesarean section was performed using a continuous spinal catheter technique. A total of 1.2 mL of 0.5% heavy bupivacaine and fentanyl 25 μg of was used.

Second pregnancy: 9 months later at 32 weeks of gestation, she presented to the emergency department with selective serotonin reuptake inhibitor and NSAID overdose. Due to unavailability of neonatal cots locally, she was transferred to the nearest unit with a neonatal cot. Anaesthetic risks and management plan were discussed with the receiving hospital team. On arrival at the hospital, decelerations were noted on the CTG and an uneventful caesarean section was performed using the same intrathecal drugs stated above but as a single-shot spinal injection.

Discussion: This case presents successful management of a pregnant woman with Conradi Hunnemann Syndrome who had a difficult airway, a potentially difficult regional block from previous kyphoscoliosis surgery and a risk of worsening cerebellar tonsillar herniation compounded by poor patient compliance.
P82 Ogilvie’s syndrome and intestinal obstruction after caesarean section: a case report and guideline review

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Introduction: CEMACH reports have identified intestinal obstruction as a potentially fatal complication of caesarean section. We describe a case of Ogilvie’s syndrome (acute colonic pseudo-obstruction) complicated by caecal volvulus with perforation after elective caesarean section.

Case report: A 37-year-old (G3P2) ASA 1 female was admitted for caesarean delivery at 38 weeks of gestation. Two previous pregnancies had required caesarean sections. She had a subarachnoid block with hyperbaric bupivacaine and fentanyl. Sensory block was elicited to T4 bilaterally and she had a live 3.28-kg girl. Haemodynamic parameters were stable. On the first postoperative day the patient reported abdominal distension, pain and nausea. Initial conservative management included: flatus and nasogastric tubes, enemas, total parenteral nutrition and two decompressive colonoscopies. Serial imaging identified dilated large bowel. On day 6, the patient underwent urgent laparotomy. Surgical findings were a caecal volvulus with necrotic wall adherent to the abdominal wall, and gross faecal contamination. Ileo-caecal resection with primary anastomosis was performed. Noradrenaline was infused for 18 h postoperatively in critical care. The patient was discharged home on the tenth post-laparotomy day.

Discussion: Intestinal obstruction complicates 1 in 2500 pregnancies, the most common cause being admissions. Postoperative ileus is uncommon following caesarean section as there is minimal bowel handling. The differential diagnosis of intestinal obstruction post-caesarean is usually between mechanical obstruction secondary to colonic volvulus and Ogilvie’s syndrome. The latter carries significant morbidity and mortality, and therefore requires urgent management. Colonoscopy may be diagnostic and therapeutic, although over half of cases recur and surgery becomes necessary. Increasing age and caecal diameter, delay in decompression and bowel status influence mortality. Once the caecal diameter is >12 cm or the distension has been present for more than 6 days (as in our case), risks of ischaemia and perforation are dramatically increased.

In 1948, Ogilvie suggested that the syndrome was due to an imbalance of autonomic innervation to the midgut. 1 Subarachnoid block may contribute but the pathogenesis is multifactorial (opioid analgesia, overproduction of nitric oxide). Anaesthetists may be unfamiliar with the 2006 RCOG guideline on the treatment of this uncommon life-threatening complication of caesarean section. 2 Serial examination, surgical review, intravenous neostigmine and colonoscopic decompression are all advocated.

References

P83 Parturients with prolonged QT interval: a series of deliveries

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Introduction: The long QT syndrome (LQTS) is a cardiac ion channel disorder producing prolonged ventricular repolarisation putting patients at risk of ventricular arrhythmias. Reported prevalence is 1:1100–3000. Diagnosis is based on the QTc of the ECG being greater than 440 ms. 1

Method: Following ethics approval and patient consent, charts were reviewed of women with LQTS delivering in Vancouver.

Results: Three deliveries were assessed:

Case 1: A 32-year-old G1P2, caesarean delivery (CD). She was diagnosed with LQTS following cardiac arrest precipitated by waking up suddenly from an alarm, and had an automated implantable cardioverter defibrillator (AICD) inserted. Antenatally she was thoroughly assessed by anaesthesia and cardiology. She was hypertensive, treated with atenolol. Preoperatively her magnesium was 0.7 mmol/L and potassium 4.2 mmol/L. Before surgery 2 g of magnesium was infused. A spinal was given using 0.75% bupivacaine 1.4 mL, fentanyl 15 μg and morphine 200 μg. Phenytoxine was used to maintain blood pressure. During surgery a magnet was positioned over the AICD. She had an oxytocin infusion post partum and had no arrhythmias.

Case 2: A 31-year-old G0,P2 woman with acquired LQTS following treatment with methadone and antiretrovirals. Previously she had a cardiac arrest and had a pacemaker inserted. During pregnancy her QTc varied between 402 and 497 ms. She was induced at 39 weeks for cholestasis. A CD was performed for fetal distress using a CSE (spinal dose 0.75% bupivacaine 1.6 mL, fentanyl 10 μg and morphine 200 μg). Bipolar diathermy was used and the crash trolley was in the operating room. She made an uneventful recovery with no arrhythmias.

Case 3: A 29-year-old G1,P0 with LQTS and hypertrophic cardiomyopathy was admitted in labour and started on continuous cardiac monitoring. Antepartum her QTc was between 402 and 497 ms. She was induced at 39 weeks for pre-eclampsia. A CD was performed for fetal distress using a CSE (spinal dose 0.75% bupivacaine 1.6 mL, fentanyl 10 μg and morphine 200 μg). Bipolar diathermy was used and a magnet was positioned over the AICD. She had no arrhythmias. During surgery a magnet was positioned over the AICD. She had an oxytocin infusion post partum and had no arrhythmias.

Discussion: Delivery of LQTS parturients can be problematic and careful planning is vital. In all cases neuraxial techniques were used successfully. There was close management of electrolytes and haemodynamic changes and certain drugs were avoided. 1

Reference
P84 Origins of OAA abstracts published in IJOA
LA Arrandale, GNB Jackson, MJ Mackenzie, SM Yentis
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Introduction: The number of abstracts presented at the Obstetric Anaesthetists Association (OAA) meeting and published in the International Journal of Obstetric Anaesthesia (IJOA) has increased in the last decade. We wondered whether the abstracts’ geographical origins have also changed, especially as the OAA has become an increasingly international body rather than a purely UK-based one.

Method: For all abstracts presented at OAA meetings and published in IJOA, we recorded the submitting hospital, city, Strategic Health Authority (for England), country and global zone. For abstracts originating in multiple hospitals the first listed was used for analysis.

Results: 892 abstracts were reviewed. The yearly total of abstracts published rose from 12 in 1991 to 108 in 2008; regional distribution is shown in the Figure.

Discussion: Despite many members, speakers and delegates at its meetings coming from outside the UK, the number of OAA abstracts from overseas remains small. The proportion of abstracts from London has fallen slightly in recent years but it remains the biggest source compared with other regions, averaging 28% of abstracts per year and only surpassed twice (2004 and 2006). Surges in regional representation occur when the OAA meeting is hosted locally, e.g. from continental Europe for the Versailles meeting in 2004 (28%), London in 2005 (35%), and Scotland for the Glasgow meeting in 2006 (24%). However, this effect is not consistent (e.g. the Sheffield meeting in 2007). At the Belfast meeting in 2008 there was a small increase in N. Ireland abstracts, though at this meeting, for the first time, only ~60% of presented abstracts were actually published and we did not analyse the other ~40%.

Reference

P85 The International Journal of Obstetric Anesthesia: more cited now indexed
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Introduction: The International Journal of Obstetric Anesthesia (IJOA) is ranked 12th according to the 2007 impact factors for anaesthetic journals but was only indexed on MEDLINE in 2004. A study in 2004 assessed IJOA’s importance, by seeing from which journals obstetric anaesthesia papers were most frequently cited over the preceeding five years. IJOA was the third most frequently cited journal and it was suggested that Medline indexing would improve this. We investigated whether there had been an increase in citations following Medline indexing in 2004.

Method: We searched the internet-based Web of Science database using the Cited Reference Search for cited work (INT J OBSTET ANESTH*) and each individual year 1992-2008 using the Science Citation Index Expanded (SCI EXPANDED) – 1970-present. We also recorded IJOA’s impact factor between 1999 and 2007 using the Journal Citation Report.

Results: The number of citations to IJOA articles increased up to ~2000, following which it remained roughly constant until IJOA was indexed in MEDLINE (Fig. 1). IJOA’s impact factor increased from 0.216 in 1999 to 0.963 in 2002; it remained around 0.9 until 2005 when it rose to 1.11 and then to 1.621 in 2006.

Discussion: Both citation count (total within the year) and impact factor (citations per published article within the previous two years) rely on the number of articles published in IJOA that are being cited in the literature. The increase in both indices that followed IJOA’s indexing in MEDLINE suggest a significant effect of indexing, either directly via listing in searches or indirectly via increased quality of submission.

References
1. ISI Web of Science. http://wok.mimas.ac.uk/
P86 Types of abstract presented at OAA meetings
LA Arrandale, MJ Mackenzie, GNB Jackson, SM Yentis
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Hospital & Imperial College, London, UK

Introduction: The number of abstracts presented at the Obstetric Anaesthetist’s Association (OAA) meeting has increased markedly. We speculated that this might represent increasing pressure, especially on trainees, to improve their CVs. We also suspected that this would be reflected in a changing pattern in the types of abstract presented.

Method: We reviewed all abstracts presented at OAA meetings and published in the International Journal of Obstetric Anaesthesia (IJOA) since the latter’s inception in 1991. We recorded whether they were surveys, simulator studies, reviews, interventional randomised (RCT) or non-randomised (non-RCT) controlled trials, laboratory studies, historical studies, guidelines, case reports/series, audits or animal studies.

Results: 892 abstracts were reviewed; the types of study are shown in the Figure.

Discussion: The increase in the total number of abstracts has been noted elsewhere. The most marked changes in the type of abstract are increases in the proportions of audits, non-RCTs and surveys, and a decrease in the proportion of RCTs. Although we were not able to identify the relative input of trainees vs non-trainees from the details available in the abstracts, we have noticed an overwhelming preponderance of trainees presenting at OAA meetings compared with non-trainees. We conclude that there has been a shift away from the more difficult RCTs to studies that are easier to set up and conduct, and that this is likely to represent increasing pressure on trainees to perform and publish projects.

Reference

P87 Types of article published in IJOA since inception
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Introduction: There have been increasing barriers to conducting and publishing research in the UK in recent decades including restricted research budgets and tighter ethical and regulatory control. The number of interventional trials published in Anaesthesia has indeed decreased over the last 25 years. We were interested to see if this was also reflected in the types of paper published in the International Journal of Obstetric Anesthesia (IJOA).

Methods: Using online access to IJOA, we categorised articles into the following: observational, interventional (RCTs and non-RCTs), surveys, reviews (including ‘Controversies’) and other. Editorials, correspondence, and abstracts were excluded.

Results: The mean ± SD number of publications per year was 48 ± 14; types of article are shown in Fig. 1.

Discussion: From anecdotal experience we expected an increase in the number of non-interventional studies and surveys, since these are easier to do, but Fig. 1 suggests that the proportion of different types of article in IJOA has not shown a consistent overall change. Uncontrolled factors that may affect the type and number of papers submitted include changes in medical training and in the recent job market, both of which might increase the ‘pressure to publish’ (supported by the increased number of abstracts submitted to the OAA over this period), acceptance of IJOA as an indexed journal in 2004 and increases in its impact factor over this time. We also cannot comment on any changes in editorial policy that might have taken place since 1991.

References
P88 An investigation into pain catastrophizing scores and previous labour outcomes in multiparous women

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Introduction: The pain catastrophizing score (PCS) was developed in 1995. Individuals who score highly with the use of this tool have an exaggerated response to painful stimuli. Research has shown that pain is exacerbated by anxiety and fear. Anxiety concerning labour can arise from fear of childbirth or a previous caesarean section. The purpose of this study was to identify a positive correlation between a high PCS, i.e. score $\geq$25 and previous delivery outcomes and ascertain if high scoring individuals were more likely to request regional anaesthesia in a subsequent labour.

Method: Ethical approval was obtained. Multiparous women were asked to complete a PCS questionnaire at their 20 week anomaly scan. Their maternity records were requested and the following information obtained relating to previous pregnancies and deliveries: age, parity, number of months since preceding delivery, previous pregnancy-related illness i.e. pregnancy-induced hypertension/preeclampsia/gestational diabetes, previous emergency caesarean section(s), uptake of regional analgesia in subsequent labour. The data were analysed using a 2-tailed t-test. Significance was defined as $P<0.05$.

Results: 80 PCS forms were returned, 17 were excluded due to incomplete data leaving 63 for analysis. Thirteen women in this study (20.6%) had a PCS $\geq$25. Though not statistically significant, women with a high PCS tended to have a longer time period between deliveries. A mean of 52.3 months in the high scoring group versus 36.5 months in low scores ($P=0.084$). The group with a high PCS were more likely to have a history of pregnancy-related illness with $P=0.086$. The uptake of regional analgesia by women in subsequent labours was similar in both high and low scoring groups and not associated with previous labour outcomes. No statistical significance was achieved in this study.

Discussion: It was thought the PCS tool might be able to identify women who might require anaesthetic intervention in labour. No link was identified between a high PCS and previous labour outcomes or the uptake of regional analgesia in successive deliveries. However, women with a high PCS tended to have a greater period of time between deliveries and were more likely to have suffered a pregnancy-related illness. This information may be of use in identifying women who may benefit from psychological support during subsequent pregnancies to prepare them for an improved birth experience.

References

P89 HIV in pregnancy: a retrospective study

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Introduction: HIV infection during pregnancy has an obstetric and anaesthetic impact, but pregnancy may also affect HIV disease. This retrospective trial studied the impact of HIV on pregnancy and the impact of pregnancy on HIV in all HIV-infected pregnant patients followed in a referral obstetric service.

Methodology: Following institutional ethical approval, a retrospective study was performed in all HIV+ pregnant patients who delivered in our department between Jan 2000 and Jun 2008. Obstetric outcome, HIV progression and anaesthetic technique used as well as complications were recorded.

Results: We identified 33 patients and 40 pregnancies. One dataset was incomplete and 39 pregnancies were analysed. In 5 patients HIV infection was diagnosed only in late pregnancy (n=4) or immediately after pregnancy (n=1). Mean viral load and CD4+ and CD8+ cell count remained stable throughout pregnancy and for 6 months after delivery. However in 6 patients signs of disease progression were noted after delivery: increased viral load and initiation of antiretroviral therapy. One patient died 6 months after delivery of AIDS-related complications (hepatocellular carcinoma). Caesarean section was performed in 50% of pregnancies (in 7 the reason was an increased viral load). Five patients underwent planned vaginal delivery despite $>1000/mL$ viral copies. One patient had an instrumental delivery. Most babies delivered at term, while 7 delivered preterm. No case of vertical transmission was noted. No mother breastfed and all newborns received antiretroviral drug therapy. Most patients (30/39) received combined spinal-epidural anaesthesia (CSE). In none complications of the anaesthetic were noted.

Discussion: Although overall markers of HIV infection remained stable throughout pregnancy, in several patients the disease progressed. It is unclear from this retrospective trial whether this was an effect of pregnancy on HIV or merely the natural history of the disease. CSE anaesthesia seems to be safe in this patient population. No vertical transmission was noted despite attempted vaginal delivery in several patients with increased viral load.

Reference
P90 National survey of the availability of translator services
M A Rafi, U Misra, Z Arfeen
Anaesthetic Department, Sunderland Royal Hospital,
Sunderland, UK

Introduction: The 2000-2002 CEMACH report\(^1\) highlights a lack of access to translation services, and this was implicated in one direct anaesthetic death. The survey aims to ascertain how often women who spoke little/poor English are encountered, methods used to translate, the availability of translators and associated problems.

Method: An OAA-approved questionnaire (Survey No.77) was sent to every third member of the OAA in January 2008, with a targeted reminder in July 2008.

Results: The response rate was 56% (324/578), of whom 83% (270/324) had encountered a woman who spoke little/poor English in the previous year. The first choices for means of communication were ‘family member’ (65%), ‘hospital translator’ (21%), and ‘staff’ (7%). Reasons for not using a hospital translator included delay in access (66%), cost (7%), or other (16%) e.g. not available, staff/family easier to use, or urgency/unpredictability. Most respondents preferred translation in person (69%) than by phone (13%). A unit policy on how to access translator services was available to 66%. Access was rated as easy (24%), a little difficult (53%) and very difficult (14%). The most difficult languages to access were African or Eastern European, and the easiest Urdu/Hindi, Punjabi and Polish. Over half the respondents (52%) were satisfied with the current system for access. Reasons for dissatisfaction included no access out of hours, urgency of situation/delays, and poor organisation. More than a third (36%) had experienced delays greater than an hour. Most felt access was more difficult at night (65%), often due to delays, no service, urgency and impracticalities. A cordless speaker phone was available in 40% of labour wards, but to only 28% of theatres. There was a high awareness (87%) of OAA leaflets (Caesarean section and Pain relief in labour) and 46% found them very or somewhat useful. The translations most commonly used were Polish, Urdu, Hindi and Arabic. Suggestions for availability in other languages included Bengali, Punjabi, Gujarati, Somali/African languages.

Discussion: The CEMACH report recommends that “interpreters should be provided for women who do not speak English. The use of family members, including children and partners as interpreters, should be avoided if at all possible.” Despite this recommendation the majority of respondents still rely on family members. This may be improved by having an effective policy on how to access translators at all hours. Although many prefer in person translation, delays in access and lack of availability in urgent situations or out of hours may be reduced through the use of telephone translation. Increasing the availability of cordless speaker phones in labour ward and theatre will facilitate this. Use of the OAA leaflets is limited by patient literacy, perceived cost and access issues.

Reference

P91 OAA epidural information card: is it useful?
S Thunga, A Khader, R Sashidharan
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Introduction: Obtaining informed consent for epidurals while women are in active labour has been a controversial issue. Providing written information has been shown to improve recall.\(^1\) The OAA Epidural Information Card (EIC) was developed in order to provide written information to the mother in her own language in order to allow her to make a fully informed decision.\(^2\)

Method: We introduced the EIC on our labour ward and surveyed the opinions of the women in its value over the first 4 weeks of introduction. Among 72 women who had epidurals during this period, the EIC was used in addition to a verbal explanation in 53 to obtain informed consent for the epidural. The survey was conducted during post partum follow-up.

Results

<table>
<thead>
<tr>
<th>Questions</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you receive adequate information to make an informed decision on having an epidural?</td>
<td>53</td>
<td>0</td>
</tr>
<tr>
<td>Did the information card answer all your questions/concerns about the epidural?</td>
<td>51</td>
<td>2</td>
</tr>
<tr>
<td>Were the details explained well and easy to understand in the Epidural Information Card?</td>
<td>53</td>
<td>0</td>
</tr>
<tr>
<td>Did you get the information card in the language you required?</td>
<td>53</td>
<td>0</td>
</tr>
<tr>
<td>Overall, did you find the Epidural Information Card useful?</td>
<td>52</td>
<td>1</td>
</tr>
</tbody>
</table>

26 women (49%) found the EIC more helpful than the anaesthetists’ explanation; 10 (18.9%) found the anaesthetist and 17 (32.1%) said both the EIC and anaesthetist helpful to make their decision. The 19 women who did not receive the EIC before their epidural said that they would have benefited more if they had it when they made their decision.

Discussion: Our survey shows that the OAA EIC has been very useful in obtaining informed consent. This was even more relevant in women who did not speak English. We believe that the OAA EIC is an efficient and acceptable tool that, when combined with a verbal explanation by the anaesthetist, could convey the necessary information to patients.

References
2. http://www.oaa-anaes.ac.uk
P92 Serial measurements of neonatal cardiac output following caesarean section using Doppler ultrasound: establishing reference ranges

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Introduction: Non-invasive cardiac output monitoring has never been calibrated for use in neonates. The USCOM (ultrasound cardiac output monitor) incorporates an algorithm to estimate valve areas in neonates to allow monitoring of left ventricular output at the aortic valve (AV) and right ventricular output at the pulmonary valve (PV). The aim of this study was to establish normal reference ranges for cardiac output in the healthy term neonate.

Methods: After ethical approval, 40 term neonates delivered by elective caesarean section at term, following an uncomplicated antenatal course, were recruited. Cardiac output (CO) was measured using a 2-MHz suprasternal probe at the AV and PV in triplicate at three intervals post partum (12, 24 and 48 h). All measurements were made with the neonate asleep. Statistical analysis included RMANOVA and Tukey-Kramer tests (P<0.05).

Results: The pooled results for subjects over the three time intervals were used to create 95% reference intervals (ref range) as shown.

<table>
<thead>
<tr>
<th></th>
<th>CO (L/min)</th>
<th>CO/kg (L/min kg⁻¹)</th>
<th>Stroke volume (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AV</td>
<td>Mean</td>
<td>0.786</td>
<td>0.230</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>0.117</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>ref range</td>
<td>0.56-1.02</td>
<td>0.20-0.25</td>
</tr>
<tr>
<td>PV</td>
<td>mean</td>
<td>0.795</td>
<td>0.232</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>0.117</td>
<td>0.012</td>
</tr>
<tr>
<td></td>
<td>ref range</td>
<td>0.57-1.02</td>
<td>0.21-0.26</td>
</tr>
</tbody>
</table>

No significant differences were found between measurements at either AV or PV at any time interval.

Discussion: The left and right heart cardiac output results, corrected for neonatal weight, were comparable at around 230 mL·min⁻¹·kg⁻¹. This suggests that no shunt was occurring via the ductus arteriosus although previous studies have found shunt present up to 15 h post partum. Although the USCOM can be used for non-invasive cardiac output measurement in the healthy neonate, further work is required to see if these reference ranges also apply to preterm neonates. Other applications include detecting differences in neonatal cardiac output following vasopressors used to prevent maternal hypotension during spinal anaesthesia for caesarean section.

Reference

P93 Short- and long-term effects of fetal nociceptive stimulation on pain response of rat pups in neonatal life

V Pirot, F De Buck, L Sbragia,* J Deprest, * M Van de Velde

Introduction: Early nociceptive stimulation influences the development of nociceptive pathways.1 Rat pups subjected to neonatal nociceptive stimulation show greater pain responses later in life.2 Fetuses exhibit a stress response to physical insults, with measurable hormonal and circulatory changes.3 It remains unclear whether fetal nociceptive stimulation is also associated with changed responses to pain later in life.

Method: Following ethics approval, pregnant rats were operated on day 18 of gestation (term 21 days). All fetuses from the same dam were either injected with 5 µL of normal saline (placebo, 11 dams) or 5 µL of Complete Freund’s Adjuvants, diluted 1:1 in normal saline (CFA group, 16 dams) in the left hind paw. Nine dams were not operated (control). After surgery, the dams were returned to their cages for recovery. The mothers were left undisturbed for delivery, the pups remained with their mothers until testing. At age 7 or 28 days, pups were tested for pain reaction on a hotplate (55°C) by a blinded researcher. Reaction time was recorded until first signs of pain (lifting/licking of paws, vocalisation or jumping). Results are presented as mean [SD]. One-way ANOVA was used to test overall significance. Individual groups were compared using Student’s t-test. P<0.05 was considered statistically significant.

Results: Reaction times were shorter at 7 days in both operated groups than in the control group, while at 28 days only the pups treated with in utero CFA reacted more rapidly to a painful stimulus (Table 1).

Table 1: Reaction time (s) to painful stimulus at day 7 and 28 of life.

<table>
<thead>
<tr>
<th>Age</th>
<th>CFA</th>
<th>Placebo</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 d</td>
<td>(n=35) 8.51 [1.14] *</td>
<td>7.99 [0.98] *</td>
<td>13.69 [0.97]</td>
</tr>
<tr>
<td></td>
<td>(n=47)</td>
<td>(n=48)</td>
<td></td>
</tr>
<tr>
<td>28 d</td>
<td>(n=64) 4.61 [0.12] *</td>
<td>5.30 [0.17]</td>
<td>5.32 [0.17]</td>
</tr>
<tr>
<td></td>
<td>(n=32)</td>
<td>(n=31)</td>
<td></td>
</tr>
</tbody>
</table>

One-way ANOVA was significant for both ages.

* P<0.05 vs. Control.

Discussion: In rat pups, fetal injection of CFA or placebo caused a decreased thermal nociceptive threshold at 7 days of age. At the age of 28 days, only the CFA-injected group had a decreased threshold, showing an effect on pain response that outlasts the effects of the milder stimulation of placebo injection.

References
P94 Survey of obstetric anaesthetic workforce provision in units with greater than 5000 deliveries per annum

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Introduction: The Greater Manchester region is undergoing a reconfiguration of its obstetric services. This will result in the Royal Bolton Hospital seeing an increase in its delivery rate from 4500 to 6500 deliveries per annum. To benefit Bolton during strategic workforce development, it was thought insightful to see how units with >5000 deliveries per annum provide anaesthetic care.

Method: This is an OAA approved survey of the 25 obstetric units in the UK with delivery rates >5000 per annum. The survey was designed to collate the following information: the frequency of and the staffing levels in anaesthetic antenatal clinics, provision for dedicated elective caesarean section lists, the number of anaesthetic consultant sessions per week, the number of and grade of anaesthetist(s) covering the obstetric unit during the day and on-call.

Results: 21 out of the 25 units kindly returned a completed survey. Eighteen of the responding units have a designated anaesthetic antenatal clinic. A consultant anaesthetist always staffs these clinics. Thirteen of the 18 units run their clinics independently of other commitments. The number of clinics held range from once a fortnight to three per week, with 50% of clinics taking place once a week. Fourteen units have dedicated elective caesarean section lists. Nine units run one list per weekday. Most book three caesarean sections per theatre list. Nine units have a dedicated anaesthetic consultant for elective work. The number of consultant sessions per week ranges from 6 to 20, with 62% of units providing 10 sessions per week. Regarding daytime cover, 15 units have one consultant covering the delivery suite. In addition, 11 units are staffed with 1 NCCG/ST3-7 and 8 units with 2 junior staff; 11 departments provide a separate obstetric on-call rota for consultants, with between 7 to 11 consultants covering the rota. Twenty units have one anaesthetist resident on-call, being a NCCG/ST3-7. Only one unit has two resident on-call anaesthetists for obstetrics.

Discussion: The reconfiguration of obstetric services in Greater Manchester comes at a time when there are pre-existing problems with workforce planning and growing demands on obstetric anaesthetic resources. We believe that to provide a high standard of care we should be complying with the current OAA and AAGBI recommendations for the provision of obstetric services.1 The findings from the survey show that most units with high delivery rates provide these recommended levels of care. We aim to use these data to support future workforce expansion and the delivery of anaesthetic services on the maternity unit at Bolton.

Reference
P96 The influence of antenatal class attendance on maternal anxiety
J Dolan, S Young, J Kinsella
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Introduction: Helping women to prepare for managing pain and potentially negative emotions, including anxiety, during labour is an important aspect of antenatal education. Despite the laudable aims of antenatal preparation there is mixed evidence about its efficacy. The aim of this study was to determine if attendance at antenatal classes influenced the degree of anxiety experienced by primiparous patients undergoing induction of labour.

Method: Maternal anxiety was assessed using the Beck Anxiety Inventory (BAI), a 21-item validated questionnaire that addresses both physiological and cognitive components of anxiety. After obtaining local research ethics approval, 317 primiparous patients about to undergo induction of labour completed the BAI. BAI scores in the range 0-15, 16 to 25, 26 and above were classified as minimal-mild, moderate and severe anxiety respectively as per Beck’s original definitions. The age of participants and number of antenatal classes attended were also recorded. Data were analysed using χ², Spearman correlation and student t tests.

Results: The median BAI score was 14 [range 0 - 45]. There was a significant correlation between maternal age and BAI score (r = -0.276; P = 0.001). Women aged under 25 years were more likely to be severely anxious (P = 0.001). Data on antenatal class attendance was available for 255 participants. Eighty two women (32%) attended all their antenatal classes while 90 (35%) did not attend any. Women who attended all their antenatal classes were less likely to be severely anxious than those who failed to attend any classes (P = 0.001).

<table>
<thead>
<tr>
<th>All Antenatal Classes</th>
<th>Severe Anxiety</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>34</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>138</td>
</tr>
<tr>
<td>Total</td>
<td>Yes</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>172</td>
</tr>
</tbody>
</table>

Conclusions: We have observed that, in primiparous women undergoing induction of labour, antenatal class attendance is associated with a reduction in anxiety. Attendance at antenatal classes should therefore be encouraged, particularly in those parturients aged under 25 years who are more likely to be anxious.

References

P97 The Mental Capacity Act and labour
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Introduction: Most discussion of consent for epidural analgesia in labour has been related to the adequacy of the information provided, rather than the capacity to consent. In Oct. 2007 the Mental Capacity Act (MCA) came into effect in England and Wales, specifying that in order to be able to give consent to treatment, an adult must be able to: i) understand the information relevant to the decision, ii) retain that information, iii) use/ weigh the information as part of the decision-making process and iv) communicate that decision. We assessed patients’ own impressions of their capacity to consent in labour, against the guidance contained in the MCA.

Method: After REC approval and informed consent, 30 primiparous women in labour were questioned within 4 h of receiving regional analgesia about their consenting process, using a structured face-to-face interview.

Results: Median (range) age was 32 (16-38) years and cervical dilatation was 4 (1-9) cm. Six women had CSEs, and 24 had epidurals. Eight insertions were by consultants and 22 by trainees. Responses are shown in the Table (1: completely agree; 2: mostly agree; 3: neither; 4: mostly disagree; 5: completely disagree).

Table 1. Response to questions about consent in labour.

<table>
<thead>
<tr>
<th>Adequate information to make a decision?</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>22</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

MCA requirements:

- i) able to understand?
  - 19 | 8 | 2 | 1 | 0
- ii) able to retain?
  - 7  | 17| 3 | 2 | 1
- iii) able to use/ weigh?
  - 13 | 9 | 3 | 4 | 1
- iv) able to communicate?
  - 26 | 4 | 0 | 0 | 0

Satisfied with process?

- 23 | 6 | 1 | 0 | 0

Able to give full consent?

- 26 | 2 | 2 | 0 | 0

Decision influenced by actual experience of labour?

- 27 | 3 | 0 | 0 | 0

Discussion: Women generally felt that they had received enough information to make a decision but a significant proportion revealed that they did not satisfy the individual components of the MCA during labour. Despite this, most women felt satisfied with the process and also felt that they had been able to give their full consent to the procedure. This suggests a potential conflict between women’s wishes and views, and the MCA, that merits further investigation.

References
http://www.opsi.gov.uk/ACTS/acts2005/ukpga_20050009_en_1
P98 The use of oxytocin in labor and fetal cerebral blood flow variation

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Introduction: Combination of color Doppler flow imaging and blood velocity waveform analysis allows effective monitoring of fetal middle cerebral artery (MCA) blood flow. The goal of this study was to analyze fetal cerebral blood flow disturbance caused by the use of oxytocin in labor.

Method: Following ethics committee approval and written consent, 19 patients who required active management of labor with oxytocin according to hospital protocol (Group I), mean age 23.7±2.2 years, and 17 patients with normal labor management (Group II), mean age 24.7±3.1 years, were included in the study. All patients underwent Doppler scan of MCA. By blood velocity waveform analysis we determined peak systolic velocity (PSV), end-diastolic velocity (EDV), time averaged velocity (TAV), systolic-diastolic ratio (S/D) and resistance index (RI).

Results: All results are presented in the table (M±m):

<table>
<thead>
<tr>
<th></th>
<th>Group I</th>
<th>Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSV cm/s</td>
<td>92.73 ± 1.82*</td>
<td>98.21 ± 1.87</td>
</tr>
<tr>
<td>EDV cm/s</td>
<td>24.73 ± 0.78*</td>
<td>38.61 ± 0.92</td>
</tr>
<tr>
<td>TAV cm/s</td>
<td>46.92 ± 1.05**</td>
<td>60.63 ± 1.20</td>
</tr>
<tr>
<td>S/D</td>
<td>2.42 ± 0.02**</td>
<td>1.63 ± 0.02</td>
</tr>
<tr>
<td>RI</td>
<td>0.29 ± 0.01***</td>
<td>0.39 ± 0.01</td>
</tr>
</tbody>
</table>

*P< 0.01; **P< 0.001; ***P< 0.005.

All fetal MCA flow values recorded during oxytocin administration were significantly decreased in comparison with the same values in patients with normal labor management.

Conclusion: Oxytocin administration during labor influences fetal cerebral perfusion. Doppler measurement of fetal MCA blood flow parameters in labor may be considered as an effective method of fetal cerebral perfusion monitoring.

P99 Clinical evaluation of the effect of alfentanil patient-controlled intravenous analgesia in labour on Apgar scores

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Introduction: In our unit we use the short-acting opioid alfentanil for patient-controlled intravenous analgesia (PCIA) where epidural analgesia is contraindicated. The regime consists of a 250-μg patient demand bolus of alfentanil with a 5-min lockout time and no background infusion. As with fentanyl the use of this modality has been associated with low Apgar scores. We performed a service evaluation to estimate the effects of the regime on neonates in our unit. This represents the largest series reported of this method of pain relief in labour.

Method: Patients were identified from the labour ward controlled drug records for a 40-month period and a standard dataset was retrieved from the obstetric notes. We compared the Apgar scores for neonates of the parturients who received alfentanil PCIA with those of 325 parturients who had received epidural analgesia. The latter were obtained from our PROTOS database.

Results: We identified 18 women who had received this method of analgesia in labour. Apgar scores were significantly lower where alfentanil PCIA had been used at 1 min (P<0.03, Mann Whitney) and 5 min (P<0.003, Mann Whitney). Figure one is a box plot of the data:

Conclusion: The use of alfentanil PCIA in labour is associated with significantly lower Apgar scores than is epidural analgesia. We will now change our practice to remifentanil PCIA, the use of which is associated with minimal effects on the neonate.

References
P100 Obstetric outcomes before and after the introduction of a remifentanil patient-controlled analgesia service

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Introduction: Following a feasibility study\(^1\) the option to use remifentanil patient-controlled analgesia (PCA) for labour was introduced in our unit in August 2005. The aim of this study was to assess the impact of the service on obstetric outcomes.

Method: We retrospectively compared patients who gave birth during a 2-year period before the introduction of a remifentanil PCA service with those who gave birth during a 2-year period after the service had been established for a year. The Northern Ireland Maternity System (NIMATS) is a regional database with compulsory reporting of all deliveries were retrieved from the NIMATS database for the periods September 2002-August 2004 (before the introduction of remifentanil PCA) and September 2006-August 2008 (after the introduction of remifentanil PCA). Fisher's exact test was used to compare the two datasets.

Results: A total of 5874 women gave birth during the study period when the remifentanil PCA service was available, and 4924 women gave birth in the study period before the introduction of the remifentanil PCA service. Comparisons between the women with and those without on-demand availability of remifentanil PCA demonstrated no statistically significant differences between the overall caesarean delivery rate (23.8% vs 23.6%), the elective caesarean delivery rate (9.5% vs 9.4%) or the emergency caesarean delivery rate (14.4% vs 14.2%). There was a significant ($P<0.001$) increase in both the rate of vacuum (12.3% vs. 9.8%) and forceps delivery (9.2% vs. 6.2%).

1374 of all women in the 2006-2008 period chose remifentanil PCA for analgesia with an epidural conversion rate of 10.5%. When the remifentanil group is compared with the epidural group from that period the forceps delivery (4.6% vs 21.4%), vacuum delivery (12.4% vs 18.3%) and emergency caesarean section rates (2.4% vs 21.7%) are all significantly lower ($P<0.001$) in the remifentanil group. Therefore the increase in both forceps and vacuum deliveries was not observed in the remifentanil group. The popularity of remifentanil PCA resulted in a significant decrease in the epidural rate from 33.3% to 17.2% ($P<0.001$) between the two study periods.

Discussion: We found that the introduction of the remifentanil PCA service did significantly reduce the epidural rate although there was no decrease in the rate of caesarean delivery.

Acknowledgement: We would like to thank Barbara Millar, Senior Information Analyst, for her assistance.

Reference

P101 Remifentanil analgesia for labour: clinically useful with acceptable side effects

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Introduction: For labour analgesia, remifentanil seems to have a suitable pharmacological profile,\(^1\) but both maternal and neonatal side effects have been described.\(^2\) In this prospective study we examined intravenous patient-controlled analgesia (ivpca), using stepwise bolus doses. The primary outcomes were pain reduction and maternal satisfaction.

Method: After ethics approval and informed consent, 41 singleton term parturients ASA 1 and 2 were included. Starting bolus dose was 0.15 μg kg\(^{-1}\)min\(^{-1}\), with increasing dose steps of 0.15 μg kg\(^{-1}\)min\(^{-1}\) and lockout time 2 min. Pain scores (visual analogue scale), blood pressure, respiratory rate (RR) and sedation were measured every 15 min. Maternal oxygen saturation (SatO\(_2\)) and heart rate were monitored continuously. Supplemental oxygen was administrated if SatO\(_2\) <93%. Neonatal data included Apgar scores, naloxone use, resuscitation, umbilical blood gases and umbilical serum remifentanil concentrations.

Results: Duration of remifentanil analgesia was 223±105.9 min (mean±SD). The doses varied between 0.15 and 1.05 μg kg\(^{-1}\)min\(^{-1}\).

Thirty-seven (92.5%) were satisfied with remifentanil analgesia. Three patients required cross-over to epidural because of inadequate analgesia. Lowest SatO\(_2\) was 91%, and lowest RR was 9 breaths/min. Supplemental oxygen was administrated to 11 parturients (27%). Sedation was reported by 53.5 (38.4-68.9)%). There was no hemodynamic instability. Four neonates had 1-min Apgar score <8 but at 5 and 10 min all scores were >8. No neonates needed naloxone or resuscitation.

Conclusion: Remifentanil as ivpca bolus doses give effective pain relief during labour. With increasing doses, maternal sedation and respiratory depression may occur. No serious neonatal side-effects were noted. Remifentanil is quickly metabolized in the newborn. Careful monitoring is mandatory.

References