Abstracts of free papers presented to the Obstetric Anaesthetists’ Association annual meeting in Nottingham, UK on 9–10 May, 2002

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**O01. Can density influence the spread of intrathecal bupivacaine in the prolonged sitting position before elective caesarean section?**

V Sodhi, R Fernando, S Hallworth, K Sarang, N Patel
Dept of Anaesthesia, Royal Free Hospital, London

**Introduction:** Disadvantages of the combined spinal epidural (CSE) technique include prolonged delays in sitting the epidural catheter, which may result in inadequate spinal anaesthetic spread. This randomised, double-blind study was designed to test the theory that spinal solutions of varying density would behave differently under such conditions.

**Method:** Following ethics approval, 90 women undergoing elective caesarean section under CSE were randomised into three groups (n = 30 per group) receiving either hyperbaric, isobaric or hypobaric (densities determined from a previous study) bupivacaine 10 mg with fentanyl 15 μg intrathecally, in the sitting position. Any posture-related effects on density between the solutions were potentially exaggerated by keeping patients sitting for 5 min before lying in a supine wedged position. Data collection included sensory level (cold, pin-prick, touch) and motor block assessment while sitting, immediately on lying down and at further 5-min intervals for 20 min as well as hypotensive episodes, ephedrine use, and neonatal data. Statistical analysis included ANOVA, Kruskal Wallis and Cuzick’s trend test ($P < 0.05$).

**Results:** Although sensory levels did not significantly differ between groups during 5 min of sitting ($P = 0.53$), all solutions demonstrated increased cephalad spread immediately on lying supine (figure), with significant trends of increasing block height, hypotension and ephedrine use with decreasing spinal solution density ($P < 0.0001$) over the 20-min study period.

**Conclusion:** Our data suggests that during a prolonged CSE procedure, variations in bupivacaine density do not significantly affect initial intrathecal spread. However after adopting the supine wedged position, density does influence final block characteristics.

**Reference**


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**O02. Phenylephrine, ephedrine and fetal acidosis at caesarean delivery under spinal anaesthesia**

P Mowbray, DW Cooper, M Carpenter, DM Ryall, WR Desira, MS Kokri
Department of Anaesthetics, The James Cook University Hospital, Middlesbrough, UK

**Introduction:** The aim of this study was to compare the incidence of fetal acidosis at elective caesarean delivery under spinal anaesthesia when phenylephrine, ephedrine, or a combination of the two, was used to maintain maternal systolic arterial pressure (SAP).

**Methods:** 144 ASA I-II women with a singleton pregnancy and no known fetal abnormality having spinal anaesthesia for elective caesarean delivery participated in this randomised, double-blind study. Phenylephrine 100 μg/ml (group P), ephedrine 3 mg/ml (group E), or a half strength combination of both (group PE), was given by variable rate i.v. infusion to maintain SAP at baseline. SAP was measured every minute using an automated oscillometer. Hypotension was defined as SAP < 80% of baseline. The study was designed to have an 80% chance of detecting a 15% difference in the incidence of fetal acidosis (umbilical arterial pH < 7.20 at delivery), at $P = 0.05$ (2-sided). The Kruskal-Wallis test and Spearman rank correlation were used for analysis.

**Results:** Groups were matched for spinal anaesthetic, indication for CD and uterine incision-delivery interval. Groups P and PE had a lower incidence of fetal acidosis than group E (table). Group P had the lowest incidence of nausea and vomiting. Fetal acidosis was of mixed type and was associated with a two-fold increase in umbilical arteriovenous CO₂ difference (UAOCO₂D) ($P < 0.0001$). UAOCO₂D was lowest for group P. In group E, but not in groups P or PE, the mean infusion rate correlated with UAOCO₂D ($r = 0.53 (P = 0.0001)$) and with arterial base deficit ($r = 0.48 (P = 0.0006)$).

**Table.** Results expressed as percent or median [IQR]

<table>
<thead>
<tr>
<th>Group (n)</th>
<th>P (48)</th>
<th>E (48)</th>
<th>PE (48)</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Infusion</td>
<td>0.33 [0.23]</td>
<td>0.50 [0.40]</td>
<td>0.35 [0.23]</td>
<td>0.02</td>
</tr>
<tr>
<td>Mean SAP as % of baseline</td>
<td>48%</td>
<td>69%</td>
<td>58%</td>
<td>0.12</td>
</tr>
<tr>
<td>Hypotension</td>
<td>7.31</td>
<td>7.29</td>
<td>7.31</td>
<td>0.008</td>
</tr>
<tr>
<td>Umbilical</td>
<td>[0.04]</td>
<td>[0.08]</td>
<td>[0.04]</td>
<td></td>
</tr>
<tr>
<td>arterial pH</td>
<td>2%</td>
<td>21%</td>
<td>2%</td>
<td>0.0007</td>
</tr>
<tr>
<td>Fetal acidosis</td>
<td>1.4 [0.6]</td>
<td>1.9 [0.9]</td>
<td>1.7 [0.8]</td>
<td>0.008</td>
</tr>
<tr>
<td>Nausea</td>
<td>17%</td>
<td>65%</td>
<td>56%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Vomiting</td>
<td>0%</td>
<td>35%</td>
<td>15%</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

**Conclusions:** Fetal acidosis was most frequent with ephedrine alone. The raised UAOCO₂D associated with fetal acidosis suggests a predominantly fetal mechanism for the acidosis. Increased fetal metabolic rate secondary to ephedrine-induced ß-adrenergic stimulation may be the explanation for this. We recommend using phenylephrine alone by infusion to maintain SAP during spinal anaesthesia for elective caesarean delivery.
**003. Choice of anaesthesia for Caesarean section for placenta previa**

PS Smith, APC Robinson, RC Wilson, GR Lyons, IF Russell*  
St. James’s University Hospital, Leeds, *Hull Maternity Hospital

**Introduction:** The choice of anaesthesia for women with placenta previa and a high risk of peri-operative haemorrhage is controversial. An anaesthetic risk assessment (ARA) grading has been introduced in our unit to identify patients at risk of intra-operative haemorrhage and to aid in the choice of anaesthesia. We wished to assess choice of anaesthesia against assessment of risk.

<table>
<thead>
<tr>
<th>Placental position</th>
<th>Risk factor* present</th>
<th>Previous uterine scar</th>
<th>ARA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posterior</td>
<td>No</td>
<td>No</td>
<td>1</td>
</tr>
<tr>
<td>Posterior</td>
<td>Yes</td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>Posterior</td>
<td>+/-</td>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>Anterior</td>
<td>No</td>
<td>No</td>
<td>4</td>
</tr>
<tr>
<td>Anterior</td>
<td>Yes</td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>Anterior</td>
<td>+/-</td>
<td>Yes</td>
<td>6</td>
</tr>
</tbody>
</table>

*Risk factors: age > 30, multiparity, previous caesarean.

**Methods:** A prospective observational study was conducted at two teaching hospitals from January 1999 to December 2001 recording all cases of caesarean delivery for placenta previa. Data recorded included patient characteristics, urgency of surgery, position of placenta, anaesthetic technique, estimated blood loss, blood transfusion and postoperative care requirements.

**Results:** Data were collected from 47 patients. Regional anaesthesia was chosen in 90% of women ARA 1-4 (N = 29). One woman (ARA 4) with regional anaesthesia required a blood transfusion. One general anaesthetic was used for anaesthetist’s preference in a woman (ARA 3) with a previous fibroid myomectomy. Two other general anaesthetics were given for regional contra-indications: one emergency for antepartum haemorrhage and one refusal of consent. There was a significant increase in the anaesthetist’s preference for general anaesthesia in ARA 5-6 (N = 18), (Fisher’s exact test P < 0.01). Ten (55%) of these women had general anaesthesia; three required massive transfusion (>10 units) and ITU care, including two who required hysterectomy. Eight cases (ARA 5) had regional anaesthesia; all had intra-operative estimated blood loss <700 ml. No cases were converted from a regional to a general technique. The use of regional anaesthesia in ARA 5-6 increased from 22% (2/9) in the first 18 months to 66% (6/9) in the last half of the study (NS).

**Conclusions:** The choice of anaesthetic is influenced by the ARA grading with a reduced threshold for general anaesthesia in ARA groups 5 and 6.

**004. Left lateral versus supine wedged position for onset of spinal block, following combined spinal-epidural anaesthesia for caesarean section**

NL Lewis, JP Downer, EL Ritchie, MR Nel  
Dept. of Anaesthesia, Hillingdon Hospital, Middlesex

**Introduction:** Cardiac output in late pregnancy alters with maternal position, due to aortocaval compression. Maximum stroke volume is recorded in the left lateral position.1 This prospective, randomised trial compares a spinal block which develops in the left lateral position after combined spinal-epidural (CSE) insertion for caesarean section, with a block that develops in the traditional supine wedged position.

**Methods:** Following ethics committee approval and written informed consent, 60 women undergoing elective caesarean section were recruited. With the patient sitting, the epidural space was identified at L3/4 or L4/5. Dural puncture was performed using a 27-gauge pencil point needle and 0.5% hyperbaric bupivacaine 2.2 ml with fentanyl 1.5 μg was injected. After epidural catheter insertion, the patient was placed in the randomised study position, either full left lateral (LL) or supine with a wedge under the right hip (SW). Systolic blood pressure was maintained within 20% of baseline with boluses of ephedrine and/or fluid. Height of block was assessed every 2 min using ethyl chloride, and the time to bilateral loss of cold sensation up to T4 was recorded. Other variables recorded were patient demographics, Bromage scores, maximum block height, block supplementation, degree of hypotension, nausea and vomiting, ephedrine usage and fluid administration. Fetal outcome was assessed by umbilical artery pH and Apgar scores at one and five minutes. Postoperatively, women indicated pain and/or discomfort during surgery on two 10-cm visual analogue scales. Data were analysed using Student’s t-test, the Mann-Whitney and χ² tests as appropriate; P < 0.05 denoting significance.

**Results:** Seven patients were excluded because of technical difficulties with the CSE, leaving 25 and 28 in the LL and SW groups respectively. The median onset times to T4 (interquartile range [range]) for LL and SW patients were 15 (13–19 [8–25]) and 12 (10.8–14 [7–25]) min respectively. This difference was significant (P = 0.004). There was no significant difference between groups in any other variable, apart from the one-minute Apgar scores [range] which were 9 [8–10] and 9 [6–9] in the LL and SW groups respectively (P = 0.04).

**Conclusion:** After CSE insertion in the sitting position, using hyperbaric bupivacaine plus fentanyl, the left lateral position allows development of a spinal block for caesarean section with similar characteristics to a block obtained in the supine wedged position. Although the onset time is slower, this potential drawback may be outweighed by the improved maternal cardiac output which the left lateral position permits.

**Reference**

O05 Ropivacaine 0.75% vs. bupivacaine 0.5% + fentanyl 100 μg for epidural caesarean section

N Christelis, J Harrad, P Howell
Department of Anaesthesia, Homerton University Hospital, London E9 6SR

Introduction: Recent studies have suggested that ropivacaine is less potent than bupivacaine. Therefore, when given in equipotent doses, the previously claimed benefits (reduced toxicity and motor block) may be less evident. This double-blind, randomised controlled trial compared the effectiveness of epidural ropivacaine 0.75% (licensed in the UK) and the commonly-used unlicensed mixture of bupivacaine 0.5% + fentanyl 100 μg for caesarean section.

Method: After ethics committee approval, 80 women for elective caesarean section received a 3-ml test dose of 2% lignocaine, then either 0.75% ropivacaine 20 ml (group R) or 0.5% bupivacaine 20 ml + fentanyl 100 μg (group BF). Supplemental 2% lignocaine (maximum 10 ml) was used as rescue medication. Data were analysed using Mann-Whitney, X² and t-test.

Results: Thirteen women were removed from the study due to inadequate epidural block (R: 9, BF: 4, P = NS). In the 67 successful blocks, mean [SD] time to T4 sensory block (R = 15.8 [4.6] min, BF = 18.7 [9.1] min) and S1 block (R = 18.3 [4.6] min, BF = 17.4 [7.6] min) were similar (P = NS). More i.v. fluids were given to women in group R (2250 [433] ml vs. 2034 [385] ml, P < 0.04).

There were no differences between the groups with respect to patient demographics, epidural technique, quality of block, intra-operative supplementation, pruritus, satisfaction or neonatal outcome. However, there was a highly significant difference in the mean duration of motor block, being longer after ropivacaine than bupivacaine/fentanyl (R = 237 [84] min vs. BF = 144 [76] min, P < 0.00002).

Discussion: Epidural ropivacaine 0.75% offers no immediate clinical advantage over a standard bupivacaine 0.5% + fentanyl mixture for de novo caesarean section, and is associated with prolonged motor block.

References

O06. Prospective audit of non-elective caesarean section referrals to anaesthetists July–Sept 2001

ND Roberts, AE May
Leicester Royal Infirmary, Leicester, England

Introduction: A 4-point classification system for the urgency of caesarean section has been introduced. Delays following the decision to deliver contributing to adverse fetal outcome have been attributed to poor communication. This audit reviews communication in 100 non-elective caesarean sections from a total of 177.

Methods: The grade of the surgeon and anaesthetist was recorded. The health professional referring to the anaesthetist and the mode of communication was also noted. Obstetric caesarean section grading, its accuracy and the presence of a working epidural were documented. The anaesthetic technique, reason for its choice and whether this was correct in retrospect was also recorded.

Results: Case division according to the four point classification was grade 1: 38 (21.5% of all caesarean sections), grade 2: 55 (31%), grade 3: 7 (4%) and grade 4: 77 (43.5%). Referrals to the anaesthetist were obstetric SpR 55%, midwife 28%, consultant obstetrician 10%, obstetric SHO 3% and others 4%. 93% of midwife referrals were by phone compared with 25% by doctors who tended to use personal communication. Either no information or prompting for information occurred in 43% of cases with a roughly equal distribution between grades of urgency. Communication was worse during the day. Over 20% of information regarding grades 1 and 2 was incorrect. Communication was worse during the day. Over 20% of information occurring in 43% of cases with a roughly equal distribution between grades of urgency. Communication was worse during the day. Over 20% of information regarding grades 1 and 2 was incorrect. In 43% of midwife referrals either no information was offered (6 cases) or prompting (6 cases) was necessary. Overall 50% of their referrals provided inaccurate information. In 82% of SpR referrals (45 cases) information was volunteered and this was accurate in 89%.

In 4 cases (14%) referred by midwives inappropriate anaesthesia was used because of inaccurate information. Two grade 1 caesarean sections performed under general anaesthesia could have had epidurals topped up for delivery. Three cases with pre-eclampsia referred by the SpR could have been managed with regional anaesthesia. Six cases (4 grade 1) appeared in theatre with no prior contact with the anaesthetist. Fourteen cases (14%) were managed by general anaesthesia, 2 of which could have received regional blockade with better referrals.

Discussion: This audit confirms that rapid, precise communication between professional disciplines is essential. This enables the use of regional anaesthesia and decreases the use of general anaesthesia. Early referral of problem cases is crucial.

References
O07. High dependency care in obstetrics
A Gaunt, SM Yentis, A Holdcroft
Magill Department of Anaesthesia, Chelsea & Westminster Hospital, London

Introduction: High dependency care in maternity units may be required even if briefly before transfer. Clinical management may be better on a maternity suite than on a general HDU because staff are experienced in the altered pathophysiology and the demands of mothers and babies.

Methods: A prospective study was conducted in 2000 through the National Obstetric Anaesthesia Database (NOAD). High dependency care was categorised using NHS definitions: 1 = single organ failure; 2 = closer observation than on a general ward; 3 = moving from/to ICU; 4 = routine recovery for a few hours; 5 = postoperative recovery for more than a few hours. The place, monitoring and therapies used were recorded for each category and patient.

Results: 4248 patients were recruited; the breakdown into categories, the duration of high dependency care and the monitoring used are shown in the Table.

Table. Different categories of high dependency care required by 3947 parturients (excluding 301 not categorised and 91 with mixed categories), duration of high dependency care and monitoring used. Values are median (IQR) [range] or number.

<table>
<thead>
<tr>
<th>Category</th>
<th>n = 117</th>
<th>n = 494</th>
<th>n = 25</th>
<th>n = 2716</th>
<th>n = 504</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration (h)</td>
<td>24(8-4)</td>
<td>16(6-25)</td>
<td>19(10-41)</td>
<td>4(1-4)</td>
<td>5(4-9)</td>
</tr>
<tr>
<td>Maternity HDU only</td>
<td>82(1-120)</td>
<td>448(1-168)</td>
<td>5(2-144)</td>
<td>1665(1-72)</td>
<td>5(1-432)</td>
</tr>
<tr>
<td>SpO2</td>
<td>87(8-22)</td>
<td>199(22-274)</td>
<td>22(22-274)</td>
<td>926(22-274)</td>
<td>274(22-274)</td>
</tr>
<tr>
<td>CVP</td>
<td>108(22-274)</td>
<td>356(22-274)</td>
<td>24(22-274)</td>
<td>2274(22-274)</td>
<td>401(22-274)</td>
</tr>
</tbody>
</table>

Conclusion: Postoperative recovery in maternity was provided in only 60% of cases. Few women in high dependency care had invasive monitoring and almost a fifth of routine postoperative patients did not have pulse oximetry.

We thank the OAA and contributing hospitals for support.

References

O08. Written information for women in labour: Does it improve knowledge about epidurals?
LA White, P Gorton. MYK Wee, N Mandal
Department of Anaesthetics, Poole General Hospital, Poole, Dorset, UK

Introduction: There is evidence that women in labour wish to be informed about the risks and side effects associated with epidurals and also that they are capable of understanding information given to them. However, receiving information at this time is not straightforward due to pain, anxiety, exhaustion and the use of opioid drugs. This audit project examined the use of a written epidural information card. The aim was to discover if knowledge levels were satisfactory and then whether the use of the card during labour improved knowledge.

Method: After approval by the hospital audit department 100 women who had used epidural analgesia for labour were interviewed on the first post partum day. The women answered 11 questions about epidurals by choosing a response from a list of up to four possible answers. A laminated A5 epidural information card (the EIC) was then introduced to the labour ward and midwives and anaesthetists were encouraged to use it during their discussions with parturients. A further 100 women were interviewed using the same format as before. Response rates were compared using the \( \chi^2 \) test.

Results: In eight out of the 11 question areas there was a statistically significant improvement in the number of correct answers. Total correct answers rose from 44% in the pre-EIC group to 64% in the EIC group (\( P < 0.001 \)).

Discussion: It is important that patients give informed consent for treatment that they receive. This includes epidural analgesia for labour. Written information improves recall of information given to patients in general. This audit suggests that the use of written information in labour markedly improves the knowledge of parturients about epidural analgesia. This may be partly due to a fuller discussion during labour, prompted by the card, and partly due to improved recall. The EIC also provides a written record of information given, although is not a substitute for good ante-natal information. It has been introduced on a permanent basis in our hospital and adopted by several hospitals in the region. It has enthusiastic support from the women, the midwives and the obstetric team.

References
O09 Blood cultures and epidural blood patches?
A National survey of clinical practice

P Sharpe, M Asif
Department of Anaesthesia, UHL NHS Trust, Leicester Royal Infirmary, Leicester, UK

Introduction: Epidural blood patch (EBP) is regarded as a highly successful treatment for dural puncture headaches. However, there is potential for introducing infection into the epidural space. It has been suggested that blood cultures should be sent at the time of performing EBP, which can provide early guidance to the organism responsible if an epidural abscess develops. Discussion with a small number obstetric anaesthetists suggested that this was not universal practice. We decided to survey national practice.

Methods: With permission from the OAA a questionnaire was sent to each lead obstetric anaesthetist in the UK. We asked if it was unit policy to send routine blood cultures when performing EBP. We asked for the management plan for an asymptomatic patient if a positive blood culture was obtained, for both inpatients and patients that had already gone home. Clinicians were also asked to comment on the temperature and white blood cell (WBC) count that would stop them performing an EBP.

Results: 160 questionnaires (64%) were returned. Of those returned 73 (46%) centres routinely send a blood culture at the time of performing EBP. It was calculated, from estimates by each unit, that a total of 2885 EBPs, with simultaneous blood cultures, had been performed in the last 10 years. It was estimated that 54 (2%) had produced a positive microbiological culture. The commonest action plan following a positive culture in an asymptomatic inpatient was to prescribe antibiotics (44%); informing the GP was commonest for outpatients (43%). One hundred and twenty-three respondents offered a value for maximum temperature, this ranged from (37-39 °) with a median of 38°C. Many clinicians commented that they did not consider WBC before EBR. Of those who do measure WBC (n = 78) the median acceptable value was 12 with a range of 7-26.

Discussion: It would appear that opinion is split over the need to perform routine blood cultures. These results suggest that the incidence of positive cultures is low. The large range in accepted WBC and temperature values makes recommendation of cut-off points difficult.

References

O10. Regional anaesthesia in parturients with low platelet counts

MWM Rucklidge, MJ Paech
Department of Anaesthesia, King Edward Memorial Hospital, Perth, Western Australia

Introduction: Epidural haematoma is a rare though serious complication of regional anaesthesia and there is debate as to the lowest platelet count that will ensure adequate haemostasis in the epidural space. Though numbers of reported cases are few, a recent recommendation suggests the healthy parturient with a platelet count of >75 x 10^9/L can receive regional anaesthesia safely. We retrospectively identified parturients over a four year period who received regional analgesia or anaesthesia when the platelet count was <100 x 10^9/L.

Methods: The hospital haematology database was searched to identify women with a platelet count of <100 x 10^9/L recorded on full blood count during the period December 1997 to August 2001. Identified records were matched with women who received regional anaesthesia during labour or delivery. The medical notes of these women were extracted to identify those with a platelet count of <100 x 10^9/L at the time of insertion of an epidural, spinal or combined spinal-epidural. The circumstances of each case were examined.

Results: 17927 women delivered over the period under review of which 9735 received regional anaesthesia. Regional anaesthesia was performed on 60 occasions in parturients with a platelet count <100 x 10^9/L and 13 of these women had a count 75 x 10^9/L. The median platelet count at insertion was 89 x 10^9/L (range 45–99 x 10^9/L). Median count at removal of the epidural catheter was 99 x 10^9/L (range 14–158 x 10^9/L). Coagulation screens before insertion of regional block were documented for 38 patients of which 2 women receiving heparin demonstrated significant prolongation of the activated partial thromboplastin time. No neurological complication was documented following any of the identified cases.

<table>
<thead>
<tr>
<th>Aetiology</th>
<th>n (%)</th>
<th>Epidural or CSE</th>
<th>Spinal</th>
<th>Decreasing platelet count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational thrombocytopenia</td>
<td>28 (47)</td>
<td>27</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Preeclampsia</td>
<td>26 (43)</td>
<td>20</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>ITP</td>
<td>4 (7)</td>
<td>4</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Unknown</td>
<td>2 (3)</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Conclusion: This retrospective chart review provides further support for a more flexible approach to the provision of regional anaesthesia for the parturient with thrombocytopenia. The benefits and risks of regional anaesthesia should be assessed for each such patient.

Reference
Platelet count & platelet function: An in vitro model for producing whole blood with low platelet counts

N Patel, R Fernando, A Riddell,* S Brown*
Dept. of Anaesthesia & *Katharine Dormandy Centre for Haemophilia, Royal Free Hospital, London

Introduction: The lowest platelet count considered safe for regional techniques has yet to be established in the normally hypercoagulable pregnant patient. This pilot study was conducted to produce an in vitro methodology to generate artificially low platelet counts in whole blood without disturbing haematocrit, clotting factors or the platelets themselves. The method will then be used to identify the point at which a falling platelet count begins to interfere with platelet function in different pregnant subpopulations as assessed by the Platelet Function Analyser (PFA-100) measuring closure time (CT, s) and the thromboelastograph (TEG) measuring maximum amplitude (MA, mm).

Method: After ethics approval, 36 ml of blood was withdrawn from male subjects (n = 4) and transferred into 3 × 10 ml and 1 × 3 ml buffered citrate, and 1 × 3 ml EDTA collection tubes. Baseline haemoglobin (Hb), haematocrit (Hct), platelet count (Plt × 10⁹/L), coagulation tests (PT, APTT and fibrinogen), MA and CT were measured using citrated whole blood. The remaining citrated blood (30 ml) was then divided: 20 ml centrifuged carefully according to a protocol to prepare platelet depleted blood (“0% platelets”) and 10 ml labelled as “100% platelets” (count known and not centrifuged). Four test samples of varying platelet count were then reconstituted by mixing together different proportions of original whole blood containing “100% platelets” with “0% platelets” in predetermined ratios of 2:1, 1:1, 1:2 and 1:3. The above tests were then repeated on these reconstituted samples. Statistical analysis included repeated measures ANOVA (P < 0.05).

Results: Whole blood with a range of low platelet counts, broadly comparable with the predetermined ratios, (100%:0%) were generated without significantly altering Hb, Hct, coagulation tests (table) or platelet integrity. Within subjects, MA and CT showed significant differences with falling platelet count.

<table>
<thead>
<tr>
<th></th>
<th>100%</th>
<th>2:1</th>
<th>1:1</th>
<th>1:2</th>
<th>1:3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb (g/dL)</td>
<td>13.4 (1.0)</td>
<td>13.4 (1.0)</td>
<td>13.4 (1.1)</td>
<td>13.4 (1.1)</td>
<td>13.4 (1.1)</td>
</tr>
<tr>
<td>Hct (%)</td>
<td>42.1 (4.2)</td>
<td>42.1 (4.2)</td>
<td>42.1 (4.2)</td>
<td>42.1 (4.2)</td>
<td>42.1 (4.2)</td>
</tr>
<tr>
<td>Platelet (× 10⁹/L)</td>
<td>137.0 (9.0)</td>
<td>137.0 (9.0)</td>
<td>137.0 (9.0)</td>
<td>137.0 (9.0)</td>
<td>137.0 (9.0)</td>
</tr>
<tr>
<td>APTT (s)</td>
<td>36.1 (5.9)</td>
<td>36.8 (5.4)</td>
<td>36.6 (6.3)</td>
<td>37.6 (5.3)</td>
<td>36.6 (6.0)</td>
</tr>
<tr>
<td>Fibrinogen (g/L)</td>
<td>2.4 (0.2)</td>
<td>2.2 (0.1)</td>
<td>2.4 (0.2)</td>
<td>2.3 (0.2)</td>
<td>2.4 (0.2)</td>
</tr>
<tr>
<td>MA</td>
<td>49.8 (4.7)</td>
<td>39.4 (4.2)</td>
<td>36.2 (6.3)</td>
<td>32.0 (8.5)</td>
<td>26.8 (3.8)</td>
</tr>
<tr>
<td>CT (s)</td>
<td>25.0 (2.2)</td>
<td>148.8 (148.8)</td>
<td>171.2 (200)</td>
<td>248.7 (174)</td>
<td>264.1 (51)</td>
</tr>
</tbody>
</table>

Fib = fibrinogen; Data are mean (SD); *P < 0.001.

Conclusion: Artificially low platelet counts created in whole blood using this in vitro model may potentially be used to study how variations in platelet numbers affect platelet function in the pregnant patient.

Reference

Pulse transit time: a new approach to haemodynamic monitoring in obstetric spinal anaesthesia

J Bruce, G Sharwood-Smith and G Drummond
Department of Anaesthesia and Simpson Memorial Maternity Pavilion, Edinburgh, Scotland

Introduction: Hypotension is a frequent complication of obstetric spinal anaesthesia. Slow response of non-invasive blood pressure measurements or using symptoms such as nausea and vomiting can delay treatment, but early use of vasopressors may be unnecessary. Pulse Transit Time (PTT) is obtained from routine non-invasive monitors, and shows beat-to-beat vascular changes during regional anaesthesia.

Method: After ethics committee approval we studied 62 patients scheduled for elective or urgent caesarean section. Patients with major medical complications or pre-eclampsia were excluded. Spinal anaesthesia was with hyperbaric 0.5% bupivacaine and diamorphine. A Datex Cardiocap provided non-invasive blood pressure, ECG, and plethysmograph signals for analysis. We recorded the time between the ECG R wave and the maximum rate of change of the optical plethysmograph at the second toe by analogue computer. Values given are median (quartiles).

Results: Data from 58 patients were analysed. Maximal changes in PTT occurred 2.39 (1.4,3.4) minutes after spinal anaesthesia. Changes in PTT and mean arterial pressure (MAP) were significantly related (r² = 0.55, P < 0.0001). Measurements of the second value of PTT were taken 0.2 (–0.2,1.0) min before the measurements of MAP.

Conclusion: PTT can be derived from standard non-invasive monitors and gives early information on the vascular effects of spinal anaesthesia. PTT is worthy of further investigation in this context.

Reference
PD01. To compare the measurement of blood pressure on the upper arm and ankle during lower segment caesarean section under spinal anaesthesia
S Sanghera, S Abernethy, A North, I Wrench
Royal Hallamshire Hospital, Sheffield Teaching Hospitals, Sheffield, S10 2JF

Introduction: We have previously reported that there is failure of non-invasive blood pressure measurement (NIBPM) during caesarean section under spinal anaesthesia in over 50% of cases.1 We felt that errors would be less likely if NIBPM could be taken at the ankle as it is immobile during caesarean section. The purpose of our study was to determine whether NIBPM on the ankle was equivalent to the arm.

Methods: Following ethics approval, informed consent was obtained from thirty women scheduled for elective caesarean section. Two non-invasive blood pressure cuffs, one on the upper arm and one on the ankle, were used to measure blood pressures at three timed intervals – before spinal insertion, immediately after spinal insertion and after delivery of the neonate.

Results: When readings were averaged, we found them to be virtually identical. However, using the method of Bland and Altman2 we found that individual readings varied widely and that the 95% confidence intervals lay well outside our limits of agreement of 10 mmHg. In the case of mean blood pressure the average difference was 3.2 mmHg with 95% confidence intervals of ±24.5 mmHg.

Conclusion: NIBPM on the ankle is on average equivalent to the upper arm during caesarean section under spinal anaesthesia. However, individual readings may vary to a large and clinically significant degree.

References

PD02. A comparison of fentanyl and diamorphine as adjuncts in spinal anaesthesia for caesarean section
S Lane, U Misra
Department of Anaesthesia, Sunderland Royal Hospital, UK

Introduction: Intrathecal diamorphine is commonly used to provide postoperative analgesia for caesarean section. Studies have shown that it is equally1 if not more effective2 than morphine in equivalent doses. Moreover morphine does not provide any intraoperative coverage, and is often used in conjunction with fentanyl. Diamorphine could possibly be used to provide both intraoperative and postoperative analgesia whilst avoiding excess pruritus and hypotension.

Method: In a randomised, double-blinded trial, 90 patients presenting for elective caesarean section were studied. Each patient was given either fentanyl 15 μg (F), diamorphine 0.25 mg (D), or both (FD) in addition to heavy 0.5% bupivacaine. Intraoperative measurements included discomfort, nausea, pruritus, ephedrine used and time taken to establish block. Postoperative items measured were discomfort, morphine PCA use, nausea and pruritus.

Results: The first 10 patients from each group were used as a pilot to calculate the total number of patients needed. Analysis of variance revealed that there was no difference in intraoperative discomfort and time to achieve adequate block between the 3 groups. A sample size of 90 patients should show a difference in ephedrine used between the D and FD group. There was no difference in PCA use between the D and FD group, but significantly more in the F group. The FD group had more intra- and postoperative pruritus than the F or D group.

Discussion: Although the study is not complete, the results from the pilot study shown that diamorphine provides the same intraoperative benefit as fentanyl with no increase in the time taken to achieve adequate block. We have also demonstrated that diamorphine provides the same postoperative analgesia as fentanyl and diamorphine combined but with less intraoperative hypotension and pruritus.

References
PD03. Evaluation of the HemoCue® for measuring haemoglobin concentrations in the obstetric population

R Yau, T Kathigamanathan, F Plaat, F Regan, GM Stocks
Queen Charlotte’s & Chelsea Hospital, Du Cane Road, London, UK

Introduction: Massive obstetric haemorrhage continues to be a major cause of maternal morbidity and mortality. In this situation, haemoglobin concentration ([Hb]) is a useful guide to red blood cell replacement. However, transportation of blood samples to the laboratory often causes delay in the availability of results. The HemoCue B haemoglobin analyser (HemoCue Ltd, Sheffield, UK) is a small, portable, bedside device that can rapidly determine [Hb]. The aim of this study was to evaluate the HemoCue in the obstetric population and compare it to our laboratory gold standard, the Abbot cell dyne 4000.

Methods: After obtaining local ethics committee approval and informed consent, 50 patients ranging from 37 weeks gestation to 24 h postpartum, who required a full blood count, were recruited. Venous blood was collected into an EDTA tube and after mixing, 1 ml of blood was withdrawn and analysed twice by the HemoCue to provide two [Hb] readings. The remaining blood collected in the EDTA tube was sent for analysis in the laboratory. The limits of agreement for the two methods were calculated using the method described by Bland and Altman. The coefficient of repeatability was also calculated for the HemoCue using the 50 duplicated readings.

Results: The range of [Hb] values was 6.8–15.1 g·dl⁻¹ (HemoCue) and 6.8–15.2 g·dl⁻¹ (Abott Dyne). The mean difference between the first HemoCue samples and the laboratory samples was −0.038 g·dl⁻¹. The limits of agreement are defined as the mean difference ±2 standard deviations and the calculated upper and lower limits of agreement (95%CI) were +0.6 (0.44–0.75) g·dl⁻¹ and −0.67 g·dl⁻¹. The coefficient of repeatability for the HemoCue was 0.54 g·dl⁻¹.

Conclusion: This study has shown that for 95% of samples taken, the HemoCue may be 0.6 g·dl⁻¹ above or 0.67 g·dl⁻¹ below the reading obtained from the laboratory analyser. Also, the coefficient of repeatability for the HemoCue was 0.54 g·dl⁻¹, which means that for 95% of the duplicate samples tested the difference between them will be less than 0.54 g·dl⁻¹. For clinical use we believe that this is an acceptable level of agreement and conclude that, for the obstetric population, the HemoCue provides rapid and accurate bedside estimation of [Hb] and is a valuable aid in the management of massive obstetric haemorrhage.

Reference

PD04. Assessment of a hand held computer to collect obstetric epidural audit data

A Pinder, I Wrench, D Shepherd, R Freeman
Royal Hallamshire Hospital, Glossop Rd, Sheffield, UK

Introduction: We wished to assess whether we could replace our paper based method of collecting epidural data, with an electronic means. We chose the iPAQ hand held computer as it is small and easy to use and interacts readily with a server-based database.

Methods: We developed a dataset of information to be recorded and a database was constructed in Microsoft SQL Server CE. Data were entered at the time of epidural insertion and at patient follow-up. The database on the iPAQ was periodically replicated with the server based database. Only datasets for patients who had not yet been followed up were retained on the handheld computer. The data on the server was displayed by means of a series of active web pages on the hospital intranet. During the 3-month trial period we continued to collect data on paper as before. At the end of the trial period we assessed the electronic data collection in three ways – (1) We compared the total number of epidurals recorded on the iPAQ and on paper. (2) We assessed the user friendliness of the device by means of a survey of the anaesthetists. (3) We looked at 20 sets of notes to see if the information recorded electronically was accurate.

Results: A total of 487 epidurals were recorded electronically, which was 89% of those on paper. The anaesthetists surveyed all thought that the iPAQ was easy to use although there were suggestions for minor alterations in the data collected. The ease of access of epidural data via the web page was perceived as an important advantage. We compared 7 data points in each of the 20 sets of notes with the information held on our database. The data recorded were correct for 139 out of 140 data points (99%).

Conclusion: The iPAQ was easy to use with a very low incidence of errors in data collected and the database was readily accessed for analysis. In future all of our audit information for epidurals will be collected by this method alone.
PD05. Mothers’ and healthcare professionals’ views on the features that influence satisfaction with childbirth

DN Lucas,* N Harper,* P Salmon,† PN Robinson,§ SM Yentis*
Anaesthetic Depts., *Chelsea & Westminster Hospital and †Northwick Park Hospital, London, and §Dept. of Clinical Psychology, University of Liverpool, UK

Introduction: Understanding maternal satisfaction and what influences it is increasingly important. We aimed to investigate the environmental, physical and emotional factors that may influence satisfaction and compare mothers’ views with those of midwives and doctors.

Methods: After ethics committee approval, 47 women were asked to describe specific features of their childbirth experience. Subjective items were removed, leaving 43 items to be presented in a questionnaire to women <96 h postpartum. Mothers were asked to rate each item for importance to their satisfaction using a 7-point scale from ‘irrelevant’ to ‘essential’. Midwives, anaesthetists and obstetricians were asked to complete the same questionnaire.

Results: 60 mothers and 60 staff completed the questionnaire. The top ten items as ranked by mothers are shown in the table below, with the corresponding rankings for the same ten items as given by staff.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Mothers</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathrooms clean</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Midwives and doctors friendly</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Having partner there all the time</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Staff helping me to relax</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Midwives and doctors talking to me</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Me in way I could understand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular postnatal checks</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Baby checked immediately</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Midwives and doctors listening and taking note of what you say</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Midwives and doctors involving partner in what was going on</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Being told exactly what would happen at every stage of labour</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Items given low rankings by both groups included dehospitalising childbirth and adhering to birth plans. Items concerned with pain relief and avoiding interventions such as induction also ranked low.

Conclusion: Features of care that mothers felt were important centred mainly on their treatment by staff. Of the mothers’ top ten items, seven also ranked in the staffs’ top ten, suggesting good understanding between the two groups. Our results also suggest that efforts to dehospitalise the childbirth experience may be unnecessary. These results echo those of an earlier study suggesting that, despite many changes to obstetric care during this time, the things that are important to mothers remain largely unchanged.

Reference

PD06. In vitro analysis of flow from multihole epidural catheters

MWM Rucklidge, CE Orlikowski, DA Doherty
Department of Anaesthesia & Women and Infants Research Foundation, King Edward Memorial Hospital, Perth, Western Australia

Introduction: Conflicting patterns of flow from multihole epidural catheters have been described. There is evidence these catheters reduce the incidence of inadequate block although the potential dangers of misplacement are well described. Whatever the pattern of flow produced, the consistency with which these catheters perform is of importance. We investigated differential flow of local anaesthetic through the individual orifices of catheters of different manufacture during constant flow rates and patient-controlled epidural analgesia (PCEA) bolus delivery.

Methods: Epidural catheters manufactured by Portex (16 gauge, 18 gauge), Abbott (19 gauge, 20 gauge), B Braun (18 gauge, 20 gauge), Becton-Dickinson (19 gauge, 20 gauge) and Pajunk (19 gauge, 20 gauge, 23 gauge) were investigated. A premixed bag of ropivacaine 2 mg/ml with fentanyl 4 μg/ml was infused by an Abbott Pain Management Provider infusion pump at constant flow rates over a 3-min period (2 ml/h, 4 ml/h, 8 ml/h, 16 ml/h), at PCEA 4-ml bolus alone and PCEA 4-ml bolus on top of the constant flow rates. Drops from each orifice were counted and each evaluation was repeated using 3 sets of each catheter.

Results: The majority of flow during constant and bolus PCEA delivery was observed from the proximal orifice of all catheters except the Braun 18-gauge and Pajunk 19-gauge. None of the catheters produced consistent patterns of flow at constant flow rates. During PCEA delivery, there was a significant difference in the consistency of flow for different evaluations of each catheter with Abbott and all Pajunk catheters performing the most consistently (P < 0.01) with a pattern of flow within 30% difference from each respective orifice at each evaluation. Flow from the Abbott catheter was consistently observed from the proximal hole, although flow from the Pajunk catheters was more evenly spread between the three orifices.

Conclusion: In vitro, most epidural catheters do not predictably produce the same pattern of flow from the same orifices. The Abbott 20-gauge and Pajunk range appear to be more reliable in this respect but the distribution of flow from the three orifices differs. If a similar pattern of flow occurs in the epidural space, choice of epidural catheter may have clinical implications.

References
PD07. Epidural saline injection following accidental dural tap in labour
F McIlveney, J Reid, P Stone, I Kestin
Queen Mother's Materni~, Hospital, Glasgow, UK

Introduction: Accidental dural tap (ADT) is a recognised complication of epidural analgesia for labour occurring in 0.5–1.0% of patients. Incapacitating and distressing post dural puncture headache (PDPH) may follow in up to 70% of patients with potential for severe neurological sequelae. Epidural blood patch (EBP) is an effective treatment. Prophylactic epidural saline following ADT may reduce the incidence and severity of PDPH¹ and limit the requirement for EBP.

Method: Over nine years, all patients who had a labour epidural were included in routine prospective audit. Data were recorded from all patients with ADT or EBP. ADT was detected by flow of CSF through the epidural needle or catheter. The epidural was resited at an adjacent space. Following return of normal motor power and sensation post partum, a 60-ml bolus of sterile saline was injected via the epidural catheter. Patients were then mobilised normally. Headache was defined as severe if it interfered with the patient’s ability to mobilise or care for her child or if there was no response to simple analgesia. EBP was offered in this case.

Results: A total of 9267 epidurals were performed and there were 72 ADTs noted (0.78%). Prophylactic saline was administered in 43/72 (59.7%) patients.

Table. Headache following ADT

<table>
<thead>
<tr>
<th></th>
<th>No saline</th>
<th>Saline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>13/29 (44.9%)</td>
<td>30/43 (69.8%)</td>
</tr>
<tr>
<td>Mild</td>
<td>4/29 (13.8%)</td>
<td>4/43 (9.3%)</td>
</tr>
<tr>
<td>Severe + EBP</td>
<td>12/29 (41.3%)</td>
<td>9/43 (20.9%)</td>
</tr>
</tbody>
</table>

Repeat EBPs were required in 2 patients in the saline group who had sustained multiple ADTs. There were no other multiple ADTs.

Discussion: Patients receiving epidural saline following ADT require fewer EBPs and experienced milder PDPH than did the group with no prophylaxis. Multiple ADTs are recognised to present with PDPH early, often within 24 h of ADT and may require repeated EBP to reduce the symptom severity. Ability to delay EBP until after 48 h may improve the efficacy of this treatment.

Conclusion: Prophylactic epidural saline consistently reduces the incidence and may delay the onset of severe PDPH requiring EBP but appears to be ineffective in multiple ADTs. It may reduce the incidence of mild PDPH. Epidural saline caused no ongoing adverse symptoms and limits the number of EBP required.

Reference

PD08. Neonatal effects of maternal oxygen supple-mentation at elective caesarean section with combined spinal epidural anaesthesia
SK Backe, G Lyons, APC Robinson, RC Wilson
Obstetric Anaesthesia, St James’ University Hospital, Leeds

Introduction: The administration of facial oxygen to awake women undergoing elective caesarean section is recommended by current texts. Whilst it may improve oxygen delivery to the fetus, no beneficial effects on neonatal acid-base status have been observed. The aim of this study was to seek more subtle neonatal effects in terms of neurologic and adaptive and capacity scores (NACS).

Methods: This controlled study randomised women with a normal singleton fetus, scheduled for elective caesarean section with spinal anaesthesia at 37+ weeks, to breathe oxygen enriched air adjusted to either FiO₂ 0.21–0.25, or FiO₂ 0.4–0.6 through a Hudson style mask. Flows were adjusted to prevent end tidal CO₂ in excess of 4.5 kPa. CSE anaesthesia was standardised. Cord biochemistry, Apgar scores at 1 and 5 min, NACS at birth and at 24 h, were obtained by a single observer who was blinded to the FiO₂. Power set at 0.80, based on a clinical difference in NACS of 2, with SD 2.7, and P = 0.05, meant that 60 subjects were required.

Results: There were no important differences in personal and obstetric characteristics between the groups. There were no significant differences in Apgar scores or NACS at birth or at 24 h, nor in umbilical venous oxygen tension (UvpO₂) and arterial standardised base excess (UASBE) between the groups.

Table. Results are mean (SD) and median [range]

<table>
<thead>
<tr>
<th></th>
<th>FiO₂ 0.21–0.25</th>
<th>FiO₂ 0.4–0.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>UASBE (mmol L⁻¹)</td>
<td>-2.0 (3.2)</td>
<td>-3.07 (2.8)</td>
</tr>
<tr>
<td>Apgar 1</td>
<td>9 [8–10]</td>
<td>9 [8–10]</td>
</tr>
<tr>
<td>UVPo₂ (kPa)</td>
<td>3.9 (0.9)</td>
<td>4.09 (0.55)</td>
</tr>
<tr>
<td>NACS birth</td>
<td>32.4 (4.5)</td>
<td>31.5 (4.2)</td>
</tr>
<tr>
<td>NACS 24 h</td>
<td>35.0 (7.1)</td>
<td>36.4 (2.0)</td>
</tr>
</tbody>
</table>

Conclusion: Doubling the maternal inspired oxygen concentration does not appear to significantly improve oxygen delivery to, nor does it have any discernible biochemical or behavioural effects on, the normal neonate at elective caesarean delivery with spinal anaesthesia.
PD09. The urgency of caesarean classification and fetal outcome
C Duke, D Leschinskiy, S Philip, S Hallworth, R Sashidharan
The Royal London Hospital, UK

Introduction: A classification system based on clinical definition for the urgency of caesarean section has recently been proposed. The relationship between fetal outcome and this classification has been studied with regards to Apgar scores showing no correlation. Our aim was to examine the relationship between this classification and fetal outcome as determined by placental umbilical arterial H⁺ concentration ([H⁺]), Apgar scores and the extent of neonatal resuscitation required at birth.

Method: All grade 1 and 2 caesarean section data collected over a ten-month period in our unit were analysed prospectively.

Results: see table

<table>
<thead>
<tr>
<th>Grade</th>
<th>mean [H⁺] (nmol/L)</th>
<th>Median Apgar score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-min</td>
<td>5-min</td>
</tr>
<tr>
<td>1 (n = 56)</td>
<td>82*</td>
<td>8†</td>
</tr>
<tr>
<td>2 (n = 108)</td>
<td>67*</td>
<td>9†</td>
</tr>
</tbody>
</table>

* P = 0.0507 Mann Whitney Rank test.
* P = 0.0044 χ² test.
† P = 0.0218 χ² test.
‡ P = 0.0264 χ² test.
§ P = 0.0264 χ² test.

Discussion: Although mean [H⁺] was higher in grade 1 than grade 2 caesarean sections, the difference was not significant (P = 0.0507). Greater numbers studied may show a significant difference. Apgar scores at 1, 5 and 10 min did reach statistical significance between grades 1 and 2 suggesting that grade 1 infants were more physiologically stressed than grade 2 infants. We suggest that this is a useful classification system, which can be used to help expedite the delivery of the most at risk infants leading to a better outcome.

References

PD10. Audit of emergency anaesthetic drug tray preparation in the obstetric theatre
A Ody, TJ Dunn
Department of Anaesthesia, Monklands Hospital, Airdrie, Lanarkshire, UK

Introduction: It has been routine practice in our obstetric theatre to draw up into labelled syringes a number of ‘core’ anaesthetic drugs for emergency use. Concerns have been raised about the lack of sterility, risk of error during preparation, possibility of tampering by a third party and poor standards of labelling and storage of such emergency drugs. This national audit examined the preparation of emergency drugs in obstetric anaesthesia.

Methods: A questionnaire was sent to the lead clinician in obstetric anaesthesia in all 261 maternity units in the United Kingdom.

Results: 82.4% of the questionnaires were returned. 90.7% of these units had an emergency drug tray available. 90% stored the drugs in a refrigerator. The main drugs that were prepared and stored in syringes were; thiopentone (177), suxamethonium (176), atropine (138), ephedrine (105), Syntocinon (60) and atracurium (36). Only 6.6% were pre-filled syringes from the hospital pharmacy or drug companies. Where drugs were prepared in the theatre area, 78% recorded the date and time of preparation on the tray but only 41.9% documented this on the actual syringe. The dose of drug was not written on the label in 37.6% of units. Pharmacy had not given advice on preparation in 70% of units, on appropriate storage site in 64%, on shelf-life in 60.8%. The pharmacy department performed quality assurance in only 3 units. 20.5% of respondents were aware of errors or complications associated with the use of an emergency drug tray. Reports included 16 where the drug in the syringe was not the same as indicated by the label and 23 where the wrong drug was administered despite an accurate label.

Discussion: The majority of obstetric units use an emergency anaesthetic drug tray, preparing the drugs in the theatre area. Quality assurance assessment and advice from pharmacy are infrequent. The use of pre-filled syringes, from pharmacy or drug companies, is rare. Use of such syringes may reduce errors, tampering by third parties and concerns about sterility and stability.

References
PD11. Time taken to perform spinal anaesthesia in emergency caesarean section

Alison Lansbury, Gordon Lyons
Department of Obstetric Anaesthesia, St James' University Hospital, Leeds, UK

Introduction: The recommended time from decision to perform urgent caesarean section to delivery should not exceed 30 minutes. This is difficult to achieve. Anaesthetic time has been cited as a reason for delay. We aimed to establish the time taken to perform a spinal anaesthetic and causes of delay.

Methods: In this prospective single centre observational study 60 consecutive spinal anaesthetics over a 5-month period were studied. A standard spinal anaesthetic was used: a 27-gauge Whitacre needle injecting heavy 0.5% bupivacaine 2.5 ml with diamorphine 400 µg into the subarachnoid space. Satisfactory block was taken as anaesthetic from T2-T4. Times from donning gloves to positioning the patient after intrathecal injection and then to first incision were recorded. Details of the anaesthetist were noted: seniority, experience on labour ward and length of time on duty. Details of the patient were also noted: BMI, gestation, previous caesarean section, and degree of cooperation. The anaesthetist assessed urgency of the delivery as emergency, urgent or scheduled.

Results:

<table>
<thead>
<tr>
<th></th>
<th>Gloves to positioning</th>
<th>Position to incision</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 48</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 60</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the emergency/urgent group there were 4 cases of gloves to positioning time of >10 min not associated with anaesthetic or patient factors. In 2 cases technical difficulty was cited as the reason for the delay. In 3 cases position to incision time was >20 min. Total time exceeded 30 min in 4 patients, with no association seen with anaesthetic or patient factors. In one case an attempt for vaginal delivery in theatre delayed the start of surgery significantly with a gloves to incision time of 53 min.

Conclusion: Median times for emergencies and the group as a whole are within published guidelines. In the extreme values seen, non-anaesthetic factors were implicated. Further audit of factors affecting time from establishment of satisfactory anaesthesia to skin incision will be necessary.

Reference

PD12. Regional anaesthesia and spinal bifida

ND Roberts, AE May
Leicester Royal Infirmary, Leicester, England

Introduction: The incidence of neural tube defects is 25 cases per 10,000 live births. Spina bifida is a broad classification which encompasses common shared features of a vertebral arch defect and caudal tethering of the spinal cord. Spina bifida occulta (SBO) may only have a cutaneous marker although functional impairment can occur. Spina bifida with myelomeningocele (MMC) consists of a sacular protrusion containing both CSF and neural tissue. The neurological deficit can vary greatly. In this case review 26 patients with spina bifida had been seen antenatally when an anaesthetic management plan had been formulated and documented in the notes.

Methods: Notes were reviewed retrospectively. The type of spina bifida, neurological deficits and MRI results were recorded as were the anaesthetic recommendations, the actual technique and any problems encountered.

Results: 25 records were reviewed. Eighteen cases were SBO, 8 were MMC; 7 (4 SBO) had had previous surgery and neurological deficits were found in 9 (5 SBO). Cord tethering (MRI) was noted in 6 patients (4 SBO), urinary problems in 5 patients (3 SBO) and severe scoliosis in 5 patients (4 SBO). Epidural anaesthesia was used in 11 patients (10 primigravida) although there was no contraindication to regional blockade in 21. Of the 7 epidurals used in SBO, 6 provided excellent analgesia and one had an inadequate asymmetric block. 7 SBO patients opted to use Entonox during their labour. Regional anaesthesia was contraindicated in 4 patients with SBO. One had had a previous dural puncture, two had extensive spinal fusions and one had a tethered cord requiring a general anaesthesia for an elective caesarean section. 16 patients had normal vaginal deliveries. Epidural anaesthesia was used in 4 patients with MMC although 7 were suitable. Excellent analgesia was achieved in 2 cases. Two patients with neurological deficits had high thoracic blocks with inadequate sacral analgesia. 4 patients were delivered by caesarean section (3 electively) using general anaesthesia because of cord tethering, patient preference and the failure of a spinal. Three patients had normal vaginal deliveries.

Discussion: Antenatal assessment is important. This review concurs with a previous study although in this study we have shown that SBO is not a benign condition and can cause the same problems as MMC. We recommend that antenatal MRI scans would help in the management of all patients with spina bifida.

References
PD13. Epidurals in morbidly obese obstetric patients
SJ Harrison, S Gowrie-Mohan
Lister Hospital, Stevenage, Herts

Introduction: The combined risks for obesity and pregnancy are significant. Regional anaesthesia is the safest approach for the morbidly obese obstetric patient, but may be technically challenging for the anaesthetist. Our unit has recorded 22 epidurals sited in morbidly obese women for labour or caesarean section over a 5-year period. Patient demographics, technical difficulty and epidural effectiveness were assessed.

Methods: Data were collected prospectively using a standardised form. Demographic data included BMI, age and ASA. Epidural details including reason for request, level of epidural placement, depth of epidural space, patient position (sitting or lateral), number of epidural attempts, and effectiveness of the epidural were recorded.

Results: Out of 22 patients, 8 underwent caesarean section, 13 had labour analgesia and one a blood patch. All had effective epidurals sited except one unilateral block for labour and one patchy block with peritoneal pain for caesarean section (not converted to GA). A long Tuohy needle was needed in 4 cases.

The following are expressed as mean +/- SD:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>46.5 +/- 6.2</td>
<td>kg/m²</td>
</tr>
<tr>
<td>Depth</td>
<td>7.5 +/- 0.9</td>
<td>cm</td>
</tr>
<tr>
<td>Attempts</td>
<td>3.4 +/- 2.2</td>
<td>cm</td>
</tr>
<tr>
<td>Level</td>
<td>L3/4–17, L2/3–4, T12/L1–2</td>
<td></td>
</tr>
</tbody>
</table>

Figure. Correlation of epidural depth and BMI.

Discussion: Our results show that the depth of the epidural space in morbidly obese patients is usually deeper, but that the correlation of BMI and epidural space is poor, so of little predictive value to the anaesthetist. This means that the usual precautions must be taken at shallow depths to avoid dural puncture and that long epidural needles should be available. Although several epidural attempts were often required in this patient group, we found effective epidurals were sited safely in the vast majority of these morbidly obese pregnant women.

References

DA Varveris, AJ England
The Royal Free Hospital, London, UK

Introduction: Thromboembolic disease is the leading cause of maternal death in the UK. Factor V Leiden is a genetic variant present in up to 60% of women who develop thromboses during pregnancy.1 It is caused by a single point mutation resulting in replacement of arginine by glutamate at the 506 position on the Factor V molecule. We outline the delivery and anaesthetic management of 8 women with treated Factor V Leiden.

Method: Women with treated Factor V Leiden were identified antenatally and audited prospectively from January 1998 to August 1999. Their mode of delivery and analgesia and anaesthesia were recorded.

Results: During the study period 5000 women delivered at our hospital. We identified 8 with Factor V Leiden and who were prescribed low molecular weight heparin (Table). Of these, one also had protein C deficiency, one had antithrombin polymorphism, and one a history of pre-eclampsia. We also identified 5 women who required treatment for deep vein thromboses during pregnancy, of these only two had Factor V Leiden. Despite receiving low molecular weight heparin during the third trimester this was stopped early enough for 7 of the 8 women with Factor V Leiden to receive regional blockade during the course of their delivery.

<table>
<thead>
<tr>
<th>Case no</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>40</td>
<td>33</td>
<td>32</td>
<td>36</td>
<td>31</td>
<td>34</td>
<td>38</td>
<td>40</td>
</tr>
<tr>
<td>Previous DVT</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Previous</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>n/k</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>miscarriage</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>n/k</td>
<td>Y</td>
<td>n/k</td>
</tr>
<tr>
<td>Family history</td>
<td>ND</td>
<td>Em</td>
<td>ND</td>
<td>ND</td>
<td>El</td>
<td>Em</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Mode of delivery</td>
<td>ND</td>
<td>CS</td>
<td>ND</td>
<td>ND</td>
<td>CS</td>
<td>CS</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Regional block</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

Discussion: We estimate that, for an incidence of 5%, about 250 women with Factor V Leiden delivered in our unit during the study period. Most of these were asymptomatic. Women with Factor V Leiden and a history of thromboembolism have a high incidence of miscarriage, pre-eclampsia and other prothrombotic states. Our case series demonstrates that anticoagulation prophylaxis for these women does not usually prevent regional blockade being sited at delivery.

Reference
PD15. Poor outcome following epidural abscess complicating epidural analgesia for labour

PR Evans, U Misra
Department of Anaesthesia, Sunderland
Royal Infirmary, Sunderland, UK

Introduction: Severe complications of neuraxial blockade for labour analgesia are thankfully rare, but potentially catastrophic in the usually fit and healthy obstetric population. Although most previously reported cases of epidural abscess were associated with good outcomes, in this case a poor outcome makes reporting of the sequence of events to diagnosis worthwhile.

Case Report: A 24-year-old primiparous Asian lady with twin pregnancy was admitted in spontaneous labour at 34 weeks’ gestation. Epidural analgesia was requested to allow augmentation of labour and provide analgesia. An epidural was sited without complication under aseptic conditions at L2/3. Delivery was by forceps 12 h later. No complications were reported at 24-h follow up. The patient was readmitted by the obstetricians, but discharged, on days 7 and 9 with non-specific symptoms. On day 11 she was again readmitted with loin, leg and back pain, tachycardia, dehydration and pyrexia of 40°C. The following day she developed significant neurological signs and further pyrexia. Despite this a diagnosis of epidural abscess was delayed a further 12 h with continued neurological deterioration. Magnetic resonance imaging and subsequent surgical evacuation confirmed an abscess at L1-4 level. Staphylococcus aureus was isolated and, although the patient received appropriate antibiotics (flucloxacillin) for 6 weeks, recovery was slow and incomplete. She walks with a stick and has a neuropathic bladder.

Discussion. Nine previous cases of epidural abscess associated with epidural analgesia for labour have been reported. 

This appears to be the tenth such case and is important because of the bad outcome. Delayed diagnosis arose because of unfamiliarity of non-anaesthetic personnel with the clinical condition. No anaesthetist was involved after 24-hour follow-up. Diagnostic features are often non-specific but when present epidural abscess must be considered and investigated appropriately. Prompt diagnosis followed by surgical evacuation and appropriate antibiotics are essential to reduce long term neurological sequelae. Open access to anaesthetic expertise and education, to improve vigilance, of those involved in post natal care is essential.

References

PD16. Assessment of the OAA leaflet ‘Pain relief in labour’

A Stewart, V Sodhi, N Harper, SM Yentis
Magill Department of Anaesthesia, Chelsea and Westminster Hospital, London, UK

Introduction: The OAA leaflet ‘Pain relief in labour’ has not been formally assessed. We aimed to assess the effectiveness of the OAA leaflet in this pilot study.

Method: After ethical approval, primiparae were randomised on booking to receive standard information with or without the OAA leaflet. At 36 weeks’ gestation they were asked about specific analgesic topics using a standard interview, and their knowledge scored as none, moderate or good. Data were compared with $\chi^2$ or Mann-Whitney U-tests with the Bonferroni correction, $P < 0.05$ denoting statistical significance.

Results: Of the 185 women recruited, 39 (21%) delivered before 36 weeks or transferred their care elsewhere and 70 (38%) could not be interviewed for staffing reasons, leaving 76 for analysis. The most common sources of information (with vs without the OAA leaflet) were friends (81% vs 92%), family (75% vs 87%), midwives (74% vs 74%), books (83% vs 71%) and information leaflets (51% vs 33%). Knowledge of techniques is shown in the Figure below:

![Graph showing knowledge of analgesic techniques](image)

*top-up for emergency Caesarean section; $P = 0.02$

Figure. Proportion of parturients with moderate or good knowledge of analgesic techniques, with (black) or without (clear) the OAA leaflet ‘Pain relief in labour’.

Conclusion: Although patients receiving the leaflet were better informed about specific analgesic techniques, this only reached significance for epidural top-ups for caesarean section. This may have been related to a small final sample size, the generally high level of knowledge in our patients, poor discerning ability of our assessment tool or relative ineffectiveness of the OAA leaflet. We believe the latter is unlikely given the trend we found. It is important that patient information leaflets are formally assessed before they are widely promoted.

Reference
PD17. Obstetric thromboprophylaxis in Medellin, Colombia: far away from the guidelines

CE Restrepo, G Gaviria, D Meneses, C Gutiérrez, F Zapata, L González
CLA-GIAO, Medellín, Colombia

Introduction: Venous thromboembolism (VTE) is a leading cause of maternal mortality in the UK. In non-developed countries this figure falls to the 4th place, after haemorrhage, pregnancy-induced hypertension (PIH) and sepsis. Inadequate VTE prophylaxis is a common cause of substandard care. Our aims were: 1) to survey the local VTE prophylaxis practice, 2) to investigate the risk factors and the prophylaxis used in cases of VTE in the last 3 years in our centre, 3) to evaluate the cost of VTE prophylaxis in the local population.

Methods: Phase I: 250 forms were sent to Medellín’s specialist obstetricians asking about their VTE prophylaxis practice. Phase II: Medical records of the obstetric unit at our clinic were reviewed for the last 3 years, looking for confirmed cases of VTE in pregnant mothers; risk factors and prophylaxis measures were evaluated. Phase III: the cost of one year of pharmacological VTE prophylaxis in the susceptible caesarean section population was calculated vs. the cost of treatment of one VTE episode in our centre.

Results: Phase I: 73 envelopes were returned (29%). 5.5% performed prophylaxis after all caesarean sections and 86.3% in high risk cases. For moderate risk the results are: >35 years 5.4%, obesity 10.9%, varicose veins 42.4%, current infection 27.3%, PIH 5.4%, emergency caesarean section 4.1% and major current illness 97%. 11.1% had institutional protocols. Phase II: 4 cases of VTE were identified during the period, 3 after caesarean section and one in the last trimester (1:896 in caesarean section and 1:4089 in non-caesarean section). In all the cases there use of prophylactic measures was inadequate. Two were in the moderate risk group and the other two belonged to the high risk group. Phase III: The cost per year of pharmacological VTE prophylaxis in susceptible caesarean section patients was around £4920 and the average cost for VTE treatment is £5079 in Medellin.

Conclusions: This is the first Colombian obstetric anaesthesia survey of this nature. For our country it is more expensive to treat the VTE than to prevent it. Despite the evidence there is a lack of awareness of this topic between our obstetricians, showing an important level of substandard care for this population.

References

PD18. Use of Syntocinon® at caesarean section in the UK

K Randall, SM Yentis
Magill Department of Anaesthesia, Chelsea & Westminster Hospital, London, UK

Introduction: Syntocinon® is commonly used to provoke uterine contraction at caesarean section although its adverse cardiovascular properties are well known. The recommended dose is 5 U given slowly intravenously (iv) and we wished to see whether current practice followed this.

Method: An OAA approved survey form was sent to lead consultants for obstetric anaesthesia in all UK maternity units in mid-2001. Subjects were asked about the routine use of Syntocinon® for emergency and elective caesarean section in their unit, and whether they knew of any problems involving the drug during the past year.

Results: Of the 240 forms sent out, 179 (75%) were returned, three of which were blank. Syntocinon® was given i.v. in all cases. Use of Syntocinon® was the same for emergency cases as for elective ones (Table).

Table. Routine use of Syntocinon® for caesarean section in the UK. Values are number (proportion) of replies

<table>
<thead>
<tr>
<th>Dose and Administration</th>
<th>Number of replies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Given routinely</td>
<td>174 (99%)</td>
</tr>
<tr>
<td>5 U by bolus</td>
<td>25 (14%)</td>
</tr>
<tr>
<td>5 U by slow injection/infusion</td>
<td>5 (3%)</td>
</tr>
<tr>
<td>10 U by bolus</td>
<td>82 (46%)</td>
</tr>
<tr>
<td>10 U by slow injection/infusion</td>
<td>57 (32%)</td>
</tr>
</tbody>
</table>

Problems with Syntocinon®:
- Tachycardia
- Hypotension
- Other

Discussion: Our survey was conducted before the dangers of Syntocinon® in excessive doses and speed of administration were highlighted in the most recent Report on Confidential Enquiries into Maternal Deaths. Our results suggest that rapid administration of Syntocinon®, and in higher doses than that recommended, was common in 2001. It would be interesting to assess the impact of this publicity on the usage of Syntocinon®, and we plan to repeat our survey in mid-2002.

Acknowledgement: We are grateful to all those anaesthetists who kindly provided this information.

References
PD19. Drug errors in the United Kingdom: a survey of obstetric anaesthetic units

K Randall, SM Yentis
Magill Department of Anaesthesia, Chelsea & Westminster Hospital, London, UK

Introduction: Drug errors in hospitals have been highlighted recently as a major issue. We undertook a survey of drug errors in obstetric anaesthetic practice.

Method: An OAA approved survey form was sent to lead consultants for obstetric anaesthesia in all UK maternity units. Subjects were asked about policies for checking anaesthetic drugs, methods for preventing drug errors and specific errors during the past year.

Results: Of the 240 forms sent out, 179 (75%) were returned, three of which were blank. Set protocols requiring anaesthetic drugs to be checked by more than one person were in place in 36 units (20%), but this fact was documented in the notes in only ten. One quarter of respondents never checked their drugs with a second party. Actual drug errors are shown in the Table. The most common preventative methods specified were coloured drug labels (35 [20%]), use of pre-filled syringes (11 [6%]) and keeping a limited supply of drugs on labour ward (10 [6%]).

<table>
<thead>
<tr>
<th>Number (proportion) of replies</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of errors:</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>&gt;4</td>
</tr>
<tr>
<td>Wrong drug</td>
</tr>
<tr>
<td>Wrong route</td>
</tr>
<tr>
<td>Wrong dose</td>
</tr>
</tbody>
</table>

Discussion: Our results demonstrate that drug errors are occurring on the labour ward and that very few units have procedures in place for checking drugs before administration. Although checking all drugs with a second person may reduce the number of drug errors, this may be impractical given current staffing levels and the pressure of time in obstetric practice. It is likely that use of coloured labels and pre-prepared drugs is widespread although these were only mentioned by a minority of respondents. We suggest that a better reporting scheme both locally and nationally may heighten awareness of drug errors and be useful as a learning tool.

Reference

P01. Effect of intrathecal clonidine anaesthesia on intra-operative outcomes during caesarean section
JR Haines, CM Cowan, PM Barclay, RG Wilkes, D Raw Liverpool Women’s Hospital, UK

Introduction: Adding clonidine to intrathecal bupivacaine improves patient comfort during caesarean section under spinal anaesthesia. Previous work has shown no adverse effects on neonatal Apgar scores, but concerns exist over intra-operative haemodynamic stability. This study investigated the intra-operative effects of two doses of clonidine administered intrathecally for caesarean section.

Methods: Following ethics committee approval, 75 patients scheduled for elective caesarean section under spinal anaesthesia were randomised to receive either 0.9% saline, clonidine 75 µg, or clonidine 150 µg, added to spinal hyperbaric 0.5% bupivacaine. Maternal haemodynamics, use of chronotropic and inotropic agents, and neonatal Apgar scores were recorded during the procedure. Data were analysed using Kruskal-Wallis and $\chi^2$ tests where appropriate. A P value <0.05 was considered statistically significant.

Results: These are outlined in Table 1.

<table>
<thead>
<tr>
<th>Observation</th>
<th>Control</th>
<th>Clon 75</th>
<th>Clon 150</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest systolic pressure (mmHg)</td>
<td>92 (15)</td>
<td>97 (14)</td>
<td>96 (13)</td>
<td>0.496</td>
</tr>
<tr>
<td>Ephedrine dose (mg)</td>
<td>11 (13)</td>
<td>10 (10)</td>
<td>14 (12)</td>
<td>0.512</td>
</tr>
<tr>
<td>Lowest heart rate (bpm)</td>
<td>83 (13)</td>
<td>77 (10)</td>
<td>75 (15)</td>
<td>0.117</td>
</tr>
<tr>
<td>Atropine given</td>
<td>13%</td>
<td>24%</td>
<td>38%</td>
<td>0.152</td>
</tr>
<tr>
<td>Alfentanil given</td>
<td>13%</td>
<td>0%</td>
<td>0%</td>
<td>0.035</td>
</tr>
<tr>
<td>Apgar@1min</td>
<td>9 (0.6)</td>
<td>9(0.5)</td>
<td>9(0.4)</td>
<td>0.339</td>
</tr>
<tr>
<td>Apgar@5min</td>
<td>10 (0.4)</td>
<td>10(0.3)</td>
<td>10 (0.3)</td>
<td>0.621</td>
</tr>
</tbody>
</table>

Conclusion: Intrathecal clonidine gives significant improvements in patient comfort intra-operatively. Its use is associated with a non-significant trend toward reductions in heart rate, with subsequent need for more chronotropic support. Neonatal Apgar scores do not appear to be affected by following its administration.

References
2. O’Meara ME, Gin T. Comparison of 0.125% bupivacaine with 0.125% bupivacaine and clonidine as extradural analgesia in the first stage of labour. Br J Anaesth 1993; 71: 651–656.

P02. Reduction in pain during caesarean section following the addition of neuroaxial opiates: a closed-loop audit
A S Habib, M Dale, C Emerson, C Allsager, A Victoria, TM Bourne
Department of Anaesthesia, Leicester Royal Infirmary, University Hospitals of Leicester, Leicester, UK

Background and goals: Pain or discomfort may occur during caesarean section performed under a regional block. In 1997, we decided to audit prospectively the incidence of pain during regional caesarean section. Towards the end of this audit, we started to use intrathecal opiates in addition to hyperbaric bupivacaine. When spinal opiates became routine practice, we decided to repeat the audit (1999).

Material and methods: We conducted two prospective audits, each lasting a year (starting 1997 and 1999). We collected information about every regional caesarean section. We defined pain as that requiring treatment after the start of surgery. Statistical analysis was done using the $\chi^2$ test.

Results: We collected data from 709 and 685 patients in the first and second audits respectively. The incidence of pain during caesarean section decreased from 19% in the first audit to 7.3% in the follow-up ($P < 0.01$). The results are summarised in the table.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Total/</th>
<th>%</th>
<th>Total/</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSE</td>
<td>709/137</td>
<td>19</td>
<td>685/50</td>
<td>7.3*</td>
</tr>
<tr>
<td>Spinal</td>
<td>373/67</td>
<td>18</td>
<td>426/24</td>
<td>5.6*</td>
</tr>
<tr>
<td>Intrathecal opiate</td>
<td>138/7</td>
<td>5.1</td>
<td>525/28</td>
<td>5.3</td>
</tr>
<tr>
<td>No intrathecal opiate</td>
<td>355/75</td>
<td>21.1</td>
<td>81/1</td>
<td>12</td>
</tr>
<tr>
<td>Performed by consultant</td>
<td>133/29</td>
<td>22</td>
<td>142/10</td>
<td>7*</td>
</tr>
<tr>
<td>Performed by trainee</td>
<td>565/108</td>
<td>19</td>
<td>519/40</td>
<td>7.7*</td>
</tr>
<tr>
<td>Sitting position</td>
<td>265/65</td>
<td>19</td>
<td>471/28</td>
<td>6*</td>
</tr>
<tr>
<td>Lateral position</td>
<td>132/19</td>
<td>12</td>
<td>501/1</td>
<td>2*</td>
</tr>
</tbody>
</table>

* *P < 0.05 compared with old audit.
† P < 0.05 compared with sitting position.

Conclusion: The use of intrathecal opiates resulted in a significant reduction of pain during caesarean section under regional anaesthesia.
P03. Documentation of peri-operative pain information during caesarean section under regional anaesthesia

AS Habib, M Dale, C Emmerson, C Allsager, A Victoria, TM Bourne
Department of Anaesthesia, Leicester Royal Infirmary, University Hospitals of Leicester

Introduction: Pain or discomfort may occur during caesarean section performed under regional blockade. This can be a cause for litigation. In 1997, we prospectively audited the incidence of pain during regional caesarean section. When spinal opiates became routine practice, we repeated the audit (1999). We also audited documentation regarding testing of the block and peri-operative pain information, which could help defend a medico-legal claim.

Methods: We conducted two prospective audits, each lasting a year. Results were analysed using the $\chi^2$ test.

Results: We collected data from 709 and 685 patients in the first and second audits respectively.

The results are shown in the following table.

<table>
<thead>
<tr>
<th></th>
<th>First audit</th>
<th></th>
<th>Second audit</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Total</td>
<td>709</td>
<td>685</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experiencing pain</td>
<td>137</td>
<td>19</td>
<td>50</td>
<td>7.3*</td>
</tr>
<tr>
<td>Pre-operative warning</td>
<td>43/137</td>
<td>31</td>
<td>31/50</td>
<td>62</td>
</tr>
<tr>
<td>pain recorded</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action taken, recorded</td>
<td>40/137</td>
<td>29</td>
<td>38/50</td>
<td>76*</td>
</tr>
<tr>
<td>anaesthetic chart</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of sensory block</td>
<td>88/137</td>
<td>64</td>
<td>48/50</td>
<td>96*</td>
</tr>
<tr>
<td>recorded</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method of block testing</td>
<td>95/137</td>
<td>69</td>
<td>48/48</td>
<td>100*</td>
</tr>
</tbody>
</table>

* $P < 0.001$

Conclusion: Our data suggests that, with continuing education and re-enforcement of the importance of documentation, a significant improvement in documentation standards can be achieved.

Reference

P04. Evaluation of a new technique (Transcutaneous Spinal Electroanalgesia) for pain relief following elective caesarean section

AM Heffernan, M Dale, AE May, P Sharpe, DJ Rowbotham
Department of Anaesthesia, Critical Care and Pain Management, University Hospitals of Leicester Trust, Leicester, England

Introduction: Recently modified TENS machines operating at considerably higher frequencies are now available.1 This technique is called transcutaneous spinal electroanalgesia (TSE). Because of the very brief (4 $\mu$s) pulses delivered, no discharges are induced in peripheral nerves and so the technique can be properly blinded by means of placebo electrodes.

Methods: Forty two women scheduled for elective caesarean section were enrolled in this prospective randomised double-blind placebo-controlled trial. They were randomised to one of two groups to receive a placebo (inactive TSE machine) or active treatment. Following a standardised regional anaesthetic technique, all patients received two 30-min sessions of TSE treatment postoperatively. Based on other data, power analysis revealed that, for the study to have a 90% power, 21 patients would be required per group.2 A blinded observer recorded time to first analgesic request, visual analogue scores at rest and on movement, categorical pain scores, sedation scores and adverse events. Results were analysed using general linear model analysis of variance, $\chi^2$ tests and Kaplan Meier survival analysis where appropriate. Data were taken as significant when $P<0.05$.

Results: There were no differences between the two groups with respect to age, body mass index or duration of surgery. The mean time to analgesic request in the control group was 120 min compared to 119 min in the active group; this was not significant ($P = 0.6$). There were no differences in visual analogue scores at rest or on movement, categorical pain scores, sedation scores, adverse events and analgesic consumption between the two groups. However this technique was well tolerated with 85% of women who received an active device expressing an interest in using it again following future surgery.

Conclusion: This new non-invasive form of pain relief has failed to demonstrate a significant benefit in postoperative analgesia following elective caesarean section.

References
P05. Remifentanil infusion as an adjunct to epidural anaesthesia for caesarean section

JM Blair, N Wallace, G Dobson, DA Hill
Department of Anaesthetics, Ulster Hospital

Introduction: A degree of intraoperative pain occurs in up to 50% of patients during caesarean section under epidural anaesthesia using 0.5% bupivacaine alone. Expectations for pain-free surgery are high, leading to patient dissatisfaction and consequent medicolegal implications. The addition of epidural opioid improves the quality of epidural anaesthesia, yet up to 42% of women require additional intraoperative analgesia. Intravenous remifentanil has been widely used in awake patients to supplement regional anaesthesia. A low-dose remifentanil infusion may reduce discomfort during epidural caesarean section without causing significant adverse effects to mother or baby.

Methods: 40 patients aged over 18 were recruited who were at more than 37 weeks gestation and scheduled for elective caesarean section. A lumbar epidural catheter was sited and patients were randomly assigned to one of two groups. Epidural anaesthesia was established with bolus increments of 0.5% bupivacaine plus either one bolus of epidural fentanyl 50 μg, or with an intravenous infusion of remifentanil at 0.1 μg·kg⁻¹·min⁻¹. Epidural or intravenous saline was used as placebo. In the presence of moderate pain or at patient request the i.v. infusion was increased by 0.025 μg·kg⁻¹·min⁻¹ up to 0.15 μg·kg⁻¹·min⁻¹ or equivalent volume of saline. If this was not successful fentanyl 25 μg i.v. was administered and repeated at 5 min as necessary. General anaesthesia was offered for persistently inadequately controlled pain. The intravenous infusion was decreased if there was any evidence of maternal or fetal adverse effects.

Results: After exclusions, 36 patients remained for analysis, 18 per study group. In the remifentanil group, 13 patients (72%) had adequate analgesia for elective caesarean section without the need for additional i.v. opioid or general anaesthesia compared with 14 patients (78%) who received epidural fentanyl.

Discussion: There was no significant difference in the numbers of patients who achieved adequate analgesia for epidural caesarean section in the two study groups. Intravenous remifentanil as an adjunct to epidural anaesthesia for caesarean section appears to provide as effective analgesia as does the standard technique using epidural fentanyl.

References

P06. Hypotension after spinal anaesthesia for caesarean section: supine tilt v full lateral position

CMendoca, J Griffiths, B Atlecanu, RCollis
University Hospital of Wales, Cardiff, UK

Introduction: Hypotension with spinal anaesthesia for elective caesarean section is common and thought to be due in part to aorto-caval compression. Brief episodes of hypotension can be unpleasant for the mother and if prolonged detrimental to the fetus. This study examines how maternal position affects the incidence of hypotension and its resistance to treatment.

Methods: The mothers received combined spinal epidural (CSE) anaesthesia in the sitting position. The spinal injection contained 0.5% heavy bupivacaine 2.5 ml, fentanyl 20 μg and morphine 100 μg. Immediately after completing the CSE, they were all put in the full right lateral position and randomised by sealed numbered envelopes to their study position. Ephedrine was given in 6-mg bolus doses up to every 2 min to treat a drop in blood pressure >20% from baseline or if the mother felt nauseous or light headed. Group 1 (n = 45) were turned to the full left lateral position and group 2 (n = 42) were placed in the supine position with a 12° left lateral tilt and if they developed hypotension the first action was to increase the tilt of the table to 20°.

Results: The number of mothers who had hypotension at some time was similar: group 1: 36/45 and group 2: 38/42, P = 0.1. This included mothers in group 1 who developed hypotension after they were turned to the supine tilt position before surgery. If they are excluded then the incidence of hypotension differs: group 1 = 29/45 and group 2 = 38/42, P = 0.03. The amount of ephedrine also differs. Group 1: the average dose of ephedrine was 12.9 mg (SD 7) and group 2: 17.5 mg (SD 10), P = 0.04. Only 4/42 patients in group 2 remained in the 12° position, but a further 5/42 required only the additional tilting manoeuvre to correct the hypotension.

Discussion: We showed that the full lateral position improved haemodynamic stability both by reducing the incidence of hypotension and by reducing the amount of ephedrine required to correct hypotension. Turning the mother into the full lateral position required extra man-power and turning her back to a supine tilt position caused episodes of hypotension. We showed that 12° tilt is not enough, as most mothers were put in the 20° position, but many mothers felt unstable at 20°, needed extra support, and two asked to be returned to their original position. We recommend the lateral position if manpower is available. Another study also found improved protection from hypotension with the full lateral position.

References
P07. Graded dosing of subarachnoid bupivacaine by height and weight for elective caesarean section

D Varveris, I Boyne, J Harten, N Smart, D Brown
Southern General Maternity Unit, Glasgow, UK

Introduction: Hypotension commonly complicates caesarean section under subarachnoid block and may be reduced by the use of low volumes of bupivacaine. The aim of this study was to determine whether a graded dosing schedule tailored to patient height and weight is associated with haemodynamic stability while still maintaining sufficient sensory block for surgery.

Method: Using the labour ward database, we conducted a 3-year retrospective case note review of all patients receiving spinal anaesthesia for elective caesarean section in which the graded dosing schedule shown in the table was used. 536 records between 1998 and 2000 were assessed for sensory block height, hypotension (30% fall below preoperative systolic or below 100 mmHg systolic), ephedrine requirements, need for additional anaesthesia, Apgar scores and maternal satisfaction.

Results: 41 records with incomplete data sets were excluded leaving a sample size of 495. A block height of T5 or above was achieved in 90.6%. Three mothers required repeat spinals and one was converted to general anaesthesia. The aim of this study was to determine whether a graded dosing schedule tailored to patient height and weight is associated with haemodynamic stability while still maintaining sufficient sensory block for surgery.

Conclusion: Haemodynamic stability was better than reported in other studies, while motor and sensory block were sufficient for surgery in the vast majority. Patient satisfaction was good in 60%.

Table. Volume of 0.5% hyperbaric bupivacaine (ml) with diamorphine 0.4 mg in 0.9% sodium chloride 0.4 ml.

<table>
<thead>
<tr>
<th>Height (cm)</th>
<th>140</th>
<th>145</th>
<th>150</th>
<th>155</th>
<th>160</th>
<th>165</th>
<th>170</th>
<th>175</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnant</td>
<td>1.5</td>
<td>1.6</td>
<td>1.8</td>
<td>1.9</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>weight</td>
<td>60</td>
<td>1.4</td>
<td>1.6</td>
<td>1.7</td>
<td>1.8</td>
<td>2.0</td>
<td>2.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(kg)</td>
<td>70</td>
<td>1.3</td>
<td>1.5</td>
<td>1.6</td>
<td>1.8</td>
<td>1.9</td>
<td>2.0</td>
<td>2.1</td>
<td>2.3</td>
</tr>
<tr>
<td>80</td>
<td></td>
<td>1.4</td>
<td>1.5</td>
<td>1.7</td>
<td>1.8</td>
<td>2.0</td>
<td>2.1</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>85</td>
<td></td>
<td>1.5</td>
<td>1.6</td>
<td>1.8</td>
<td>1.9</td>
<td>2.0</td>
<td>2.1</td>
<td>2.4</td>
<td>2.3</td>
</tr>
<tr>
<td>90</td>
<td></td>
<td>1.4</td>
<td>1.6</td>
<td>1.7</td>
<td>1.9</td>
<td>2.0</td>
<td>2.2</td>
<td>2.3</td>
<td></td>
</tr>
<tr>
<td>95</td>
<td></td>
<td>1.5</td>
<td>1.7</td>
<td>1.8</td>
<td>2.0</td>
<td>2.1</td>
<td>2.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td>1.5</td>
<td>1.7</td>
<td>1.8</td>
<td>1.9</td>
<td>2.1</td>
<td>2.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>105</td>
<td></td>
<td>1.6</td>
<td>1.7</td>
<td>1.9</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

References

P08. National survey of dose of hyperbaric bupivacaine for elective caesarean section under spinal anaesthesia at term

I Boyne, D Varveris, J Harten, A Brown
Dept. of Anaesthesia, Queen Margaret Hospital, Dunfermlin, and Southern General Hospital, Glasgow, UK

Introduction: In the UK, elective caesarean section is commonly performed under single shot spinal anaesthesia (SSS) or combined spinal epidural anaesthesia (CSE) with 0.5% hyperbaric bupivacaine. There is great disparity in bupivacaine dosing regimes, from fixed doses for all parturients, to variations according to patient parameters, and to ‘rule of thumb’ estimates. We therefore wanted to survey current practice amongst UK obstetric anaesthetists.

Methods: An Obstetric Anaesthetists’ Association (OAA) approved questionnaire was sent out to 876 consultant members of the OAA in December 2000.

Results: We received 581 replies, a 60% response rate. 482 (83%) consultants usually use the SSS technique compared to 88 (15%) using CSE. 10 (2%) ticked both. 152 (27%) do not vary the intrathecal drug dose; 125 (26%) in the SSS and 27 (31%) in the CSE group. 418 (73%) vary the dose: 357 (74%) in the SSS and 61 (69%) in the CSE group. 68% use the patient’s height, 13% use weight and 17% use other factors, to guide them with dose variation. When there is no variation, both groups use volumes from <2 to >3 ml. The mean volume in the SSS group is 2.57 ml (SD 0.24) and in the CSE group 2.4 ml (SD 0.3). When there is variation the SSS group minimum volume ranges from 1.2–3 ml (mean 2.34, SD 0.29) and the CSE group from 1.7–2.75 ml (mean 2.2, SD 0.24). The SSS group maximum volume varies from <2 to 3.6 ml (mean 2.65, SD 0.28) and the CSE group from <2 to 3 ml (mean 2.5, SD 0.31).

Conclusion: The quest for the best spinal anaesthesia technique for elective caesarean section is ongoing. The unpredictable effect of the intrathecal injection is unsatisfying. Most UK obstetric anaesthetists vary the dose, but this could be unnecessary in view of the large group who do not. Are there determining factors for the effects of intrathecal local anaesthetic? Studies comparing dose variation with fixed dose regimes might be able to give us more answers.

Reference
P09. An audit of significant breakthrough pain and its management during awake emergency caesarean section

S McKinlay, I Kestin, J Reid, P Stone
Queen Mother’s Hospital, Yorkhill, Glasgow, UK

Introduction: Significant breakthrough pain during awake emergency caesarean section is distressing for the patient and a potential source of litigation. We set out to investigate causes, management and quality of case note documentation of breakthrough pain.

Methods: We used data from prospective audit of maternal satisfaction with analgesia for delivery during the period November 1997 to March 2001. Patients who reported only moderate or poor pain relief during emergency caesarean section and those converted to general anaesthesia (GA) were identified. Their case notes were examined individually.

Results: Four groups of patients were identified. In the first group GA was unavoidable due to lack of time. These 12 patients did not experience breakthrough pain. In the second group (n = 5), lack of time again necessitated conversion of a regional technique which was not fully established to a GA, immediately after the surgical incision was made. The third group (n = 12) experienced unanticipated breakthrough pain although the anaesthetist had considered the block adequate before the surgery. These patients are detailed below.

<table>
<thead>
<tr>
<th>Technique</th>
<th>n (Incidence of pain)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinal (599)</td>
<td>429 (1.2%)</td>
</tr>
<tr>
<td>Top-up epi-low</td>
<td>372 (438)</td>
</tr>
<tr>
<td>Top-up epi-high</td>
<td>109 (121)</td>
</tr>
</tbody>
</table>

Discussion: Changing from 0.25% bupivacaine to 0.1% bupivacaine + fentanyl 2 μg/ml has not led to an increased incidence in breakthrough pain during caesarean section. Blocks were tested for cold/sharp sensation and motor block was assessed. This method has been questioned. Changes to improve case note documentation and reinforcement of the importance of suitable management of breakthrough pain are being implemented to close the audit loop. This audit has facilitated accurate informed consent in our institution.

Reference

P10. Antibiotic prophylaxis for caesarean section: an audit of practice on Merseyside

NI Gbinigie, EW Moore, CM Cowan
Wirral Hospitals, Cheshire, UK

Introduction: The benefits of perioperative antibiotic prophylaxis for caesarean section are well established, but the optimum time for their administration is controversial. This audit was performed to aid development of a regional antimicrobial protocol.

Methods: Anaesthetic and microbiology departments in Mersey region (n = 13) were contacted by postal survey in early 2001. Each was asked about their antibiotic prophylaxis policy, when and who delivered the drugs, postoperative infection rates, and whether any erroneous drug administrations had been reported. Data were analysed using Pearson’s χ²; P < 0.05 was considered statistically significant.

Results: Every anaesthetic department had instituted an anti-microbial policy, and anaesthetists administered the antibiotic agents in all the hospitals.

Table. Summary of results (expressed as percentages)

<table>
<thead>
<tr>
<th>Technique</th>
<th>Anaes.</th>
<th>Micro.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinal (599)</td>
<td>429</td>
<td>93</td>
<td>0.22</td>
</tr>
<tr>
<td>Top-up epi-low</td>
<td>372</td>
<td>99</td>
<td>0.46</td>
</tr>
<tr>
<td>Top-up epi-high</td>
<td>109</td>
<td>98</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Discussion: There appears to be a concordat between microbiology and anaesthetic departments regarding agent selection. Audits of regime efficacy appear to be infrequent. Microbiologists differ from anaesthetists regarding the optimum time of antibiotic administration perhaps because evidence for administration before incision is equivocal. Reasons stated by anaesthetists for their choice include fetal protection and drug error avoidance.

Conclusions: Despite agreement on the benefits and choice of agent between specialities, disagreement exists surrounding the timing of administration. Fears of the potential for drug error appear to be substantiated.

References
P11. Thromboprophylaxis in emergency caesarean section: an audit cycle completed

D Leschinsky, R Sashidharan
The Royal London Hospital, UK

Introduction: Thromboembolism remains the major direct cause of maternal deaths in the UK. The RCOG has issued recommendations for thromboprophylaxis, an audit conducted in our unit in 1999 showed, as did a group in Oxford, that despite recognising the risk factors, thromboprophylaxis following emergency caesarean section was inadequate. Following this audit a protocol was introduced.

Methods: In 1999 and 2001, over a period of 4 months, the presence or absence of the risk factors in all mothers having emergency caesarean section and the type of thromboprophylaxis used were audited. The mothers were classified as moderate or high risk according to RCOG risk assessment profile. The audit in 1999 was retrospective while the audit in 2001 was prospective. Staff caring for the mother were not aware of the audit.

Results:

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>TEDS Hep +/-</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary audit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mod risk (n = 18)</td>
<td>17 (14.4%)</td>
<td>5 (4.2%)</td>
</tr>
<tr>
<td>High Risk (n = 34)</td>
<td>6 (17.6%)</td>
<td>5 (14.7%)</td>
</tr>
<tr>
<td>Re-audit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mod risk (n = 76)</td>
<td>51 (67.1%)</td>
<td>25 (32.9%)</td>
</tr>
<tr>
<td>High risk (n = 28)</td>
<td>14 (50.0%)</td>
<td>14 (50.0%)</td>
</tr>
</tbody>
</table>

Conclusions and discussion: Following the application of the guidelines, thromboprophylaxis dramatically improved. All moderate risk women received adequate prophylaxis. All high-risk women received some form of prophylaxis, although it was inadequate in 50%. This is currently being acted on. Our audit reflects the findings of the most recent maternal mortality that thromboprophylaxis following emergency caesarean section has improved greatly. We reiterate their recommendations suggesting that each unit should develop its own guidelines on thromboprophylaxis, and apply them locally.

References

P12. Audit of spinal needles – ease of use and incidence of post dural puncture headache

S Macmillan, I Kestin, J Reid, PA Stone
Queen Mothers' Hospital, Yorkhill, Glasgow, UK

Introduction: In spinal anaesthesia for caesarean section, it is now widely accepted that the use of pencil-point needles reduces the risk of post dural puncture headache (PDPH), as does the use of narrower gauge spinal needles. Recently Vallejo et al. quoted an incidence of PDPH of 3.1% following spinal anaesthesia with 25-gauge Whitacre needles, but few comparative data exist on the use of 27-gauge Whitacre needles, the needle of first choice in our unit.

Method: Routine clinical audit of patients receiving spinal anaesthesia at Queen Mothers’ Hospital between November 1997 and March 2001 identified 1511 cases, of which 1323 (87.6%) were performed for delivery. Data routinely collected include needle gauge, number of attempts at regional anaesthesia, mode of delivery, anaesthetic technique for delivery, administration of general anaesthesia and maternal satisfaction. Cases of combined spinal epidural technique (CSE) were excluded from this study.

Results: Of 1511 cases of spinal anaesthesia, 1363 (90.2%) used 27-gauge Whitacre needles. In 18 (1.3%) of these cases a second, larger gauge spinal needle was used. All 18 cases proceeded to successful spinal anaesthesia. As the number of attempts at dural puncture increased, the likelihood of alternative needle selection increased.

<table>
<thead>
<tr>
<th>Attempts</th>
<th>No.</th>
<th>Success</th>
<th>Alternative size</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2</td>
<td>1001</td>
<td>100%</td>
<td>26G</td>
</tr>
<tr>
<td>2</td>
<td>189</td>
<td>97.4%</td>
<td>1</td>
</tr>
<tr>
<td>&gt;=3</td>
<td>39</td>
<td>82.1%</td>
<td>0</td>
</tr>
</tbody>
</table>

Three cases of PDPH following spinal anaesthesia were recorded, giving an incidence of 0.2%. There was no association with mode of delivery. One patient required epidural blood patch (incidence 0.07%).

Conclusion: Based on our current routine clinical practice, we conclude that the use of 27-gauge Whitacre spinal needles has a high success rate and a very low incidence of PDPH. This data were collected from a teaching hospital where a high proportion of spinal anaesthetics are performed by junior anaesthetists, often in their first obstetric rotation, thus emphasising the overall success rate of 27-gauge Whitacre needles.

Reference
P13. Every little drop counts

K Randall, SM Yentis
Magill Dept of Anaesthesia, Chelsea & Westminster Hospital, London, UK

Introduction: We noticed that while performing spinal anaesthesia for elective caesarean section, a number of drops of local anaesthetic were sometimes lost at the connection point between the spinal needle and syringe during injection. We set out to quantify this volume.

Methods: I: Heavy bupivacaine 0.5% (2.4 ml) + fentanyl 15 μg was drawn into a 5-ml or 2-ml syringe which was connected lightly to a 27-gauge B-D pencil-point spinal needle. The needle's distal opening was obstructed and the syringe's plunger pressed; the volume of 5 drops falling from the connection was measured with a 1-ml burette. We repeated this 10 times for each syringe size. II: After ethical approval we observed anaesthetists performing spinal anaesthesia using a 27-gauge needle. We counted the number of drops lost during injection and calculated the total volume lost. Statistical analysis was with the unpaired t-test, χ² test or Mann-Whitney rank-sum test. P < 0.05 denoting statistical significance.

Results: Volume lost per drop for each syringe size is shown in the Table. Sixty-four cases were managed by 16 anaesthetists (consultants and SpRs). Drops were lost in 24/40 cases (60%) with a 2-ml syringe and 8/24 cases (33%) with a 5-ml syringe (NS). The total volume lost was greater with 2-ml than with 5-ml syringes (Table). The following maternal and fetal haemodynamic indices were measured by ultrasound: stroke index (SI, l m⁻²), cardiac index (CI, l min⁻¹ m⁻²) and systemic vascular resistance (SVR, dyn s⁻¹ cm⁻⁵). Fetoplacental perfusion was assessed by systolic/diastolic ratio of the umbilical artery Doppler waveform (S/D). Fetal transmirtal early/atrial flows ratio (E/A) was measured also.

Discussion: Small volumes of intrathecal injectate cannot easily be accurately and reliably prepared, and we suggest that loss of injectate is another potential source of inaccuracy, especially if 2-ml syringes are used, although in most cases the actual volume lost is small. Our observations suggest that the trend towards low-dose spinals may increase failure rates although a prospective clinical trial would be needed to show this.

Reference

P14. Choice of anaesthesia for caesarean section in patients with severe preeclampsia

S Kinzhalova, B Zislins, P Tsyvian, O Artemieva
Ural's Research Institute of Maternity and Childhood Care, Yekaterinburg, Russia

Introduction: The aim of our study was to analyse different anaesthetic techniques for caesarean section in pregnant women with severe preeclampsia in relation to different types of maternal and mother-placenta-fetus circulation.

Material and methods: Two groups of women with severe preeclampsia undergoing caesarean section under epidural and spinal anaesthesia were examined. Groups were defined according to echocardiographic findings; group 1: women with a eukinetic circulation (n = 40), group 2: women with a hypokinetic circulation (n = 35) (Table 1). The following maternal and fetal haemodynamic indices were measured by ultrasound: stroke index (SI, l m⁻²), cardiac index (CI, l min⁻¹ m⁻²) and systemic vascular resistance (SVR, dyn s⁻¹ cm⁻⁵). Fetoplacental perfusion was assessed by systolic/diastolic ratio of the umbilical artery Doppler waveform (S/D). Fetal transmirtal early/atrial flows ratio (E/A) was measured also.

Results: Epidural anaesthesia, regardless of haemodynamic type, was accompanied by significant decrease in afterload (SVR), increase in preload and output indices (SI, CI) and increased fetoplacental perfusion with improvement in diastolic filling of the fetal left ventricle. In the case of spinal anaesthesia in both groups the decrease in peripheral vasoconstriction was not accompanied by increase in preload and output indices. The increase in CI in group 2 was a result of increase in heart rate. In eukinetic women given spinal anaesthesia, placental blood flow and fetal haemodynamic status were similar to those given epidural. In hypokinetic women, the high placental resistance and diastolic myocardial dysfunction remained after spinal anaesthesia (Table 1).

Table. Haemodynamic effects of anaesthetic technique: % of preanaesthetic value (SD)

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epidural (n = 20)</td>
<td>Spinal (n = 20)</td>
</tr>
<tr>
<td>SI</td>
<td>109 (4)*</td>
</tr>
<tr>
<td>CI</td>
<td>106 (4)</td>
</tr>
<tr>
<td>SVR</td>
<td>83 (4)*</td>
</tr>
<tr>
<td>S/D</td>
<td>82 (3)*</td>
</tr>
<tr>
<td>E/A</td>
<td>106 (2)*</td>
</tr>
</tbody>
</table>

*p < 0.05, compared with pre-anaesthetic value.

Conclusion: Epidural is the best anaesthetic method in women with severe preeclampsia independent of circulatory type.
P15. Markers of fetal acidaemia
S Monte, J Noden, G Lyons
Department of Obstetric Anaesthesia,
St. James' University Hospital, Leeds, UK

Introduction: Fetal acidaemia and spinal anaesthesia are associated, but the majority of babies with low umbilical artery pH suffer no sequelae. pH is the accepted method of acid-base assessment, and in obstetric terms, a pH of ≤7.2 raises concerns regarding fetal welfare. It combines the tissue and respiratory components of acidaemia. Actual base excess (ABE) and standardised base excess (SBE) are concentrations of titratable base of blood adjusted to a normal PCO2 and pH at 37°C. The difference between ABE and SBE reflects differences in buffering capacity between blood and extracellular fluid. Both more accurately reflect tissue acidaemia, and may be better predictors of fetal oxygen debt and anaerobic metabolism. A base deficit >12 mEq·L⁻¹ has been associated with adverse neonatal neurological effects. The relative incidence of fetal acidaemia in elective caesarean section with spinal anaesthesia was assessed with these three variables, and the above thresholds.

Methods: Observational data were collected from 100 consecutive ASA grade I and II women undergoing elective caesarean section at ≥38 weeks’ gestation. There was no suspicion of uteroplacental dysfunction, nor of any fetal problems. Spinal anaesthesia was standardised, each patient breathed air throughout, and all received an infusion of ephedrine 30 mg, in 500 ml of gelofusine at the time of subarachnoid injection. Cord biochemical data were obtained and uterine incision to delivery time was noted.

Results: The mean (SD) uterine incision to delivery time was 162 s (62 s). There were no adverse neonatal events, either at birth or 24 h after delivery. The table shows mean (SD) pH and BE with the number of acidaemic values. Fisher’s exact test is used.

<table>
<thead>
<tr>
<th>N = 100</th>
<th>pH</th>
<th>ABE</th>
<th>SBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD)</td>
<td>7.25 (0.08)</td>
<td>-3.9 (3.9)</td>
<td>-2.2 (3.2)</td>
</tr>
<tr>
<td>BD &gt; 12 mEq·L⁻¹</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>P</td>
<td>0.02*</td>
<td>0.07*</td>
<td></td>
</tr>
</tbody>
</table>

There were 19 umbilical artery samples with a pH < 7.2. *pH vs. ABE, ABE vs. SBE

Conclusion: The use of pH with its current obstetric threshold gives the greatest incidence of acidaemia. The use of SBE as a marker of fetal acidaemia gives the lowest incidence, and the difference between ABE and SBE is clinically but not statistically significant.

References

P16. Caesarean section and mediastinal mass: how to approach anaesthesia? Case report
A Cardani, S Pellicori, M Ciceri, S Di Mauro, M Roberto, G Coven, M Langer
Servizio di Anestesia e Rianimazione II, Policlinico San Matteo, IRCCS, Pavia (Italy)

Introduction: Airway management at induction of general anaesthesia is potentially life-threatening both in the case of anterior mediastinal mass and in caesarean section. With a decreased chest wall muscle tone, especially in supine position, mediastinal masses can exert a closing pressure on thoracic cardiovascular and respiratory structures, inducing sudden airway obstruction, pulmonary hypertension and superior vena cava obstruction. Regional anaesthesia avoids the need for intubation and does not interfere with the airways, so may therefore be safer; an intraoperative respiratory problem may, however, be very difficult to manage.

Case Report: A primigravida (29 yrs) at 32 weeks’ gestation presented with dyspnoea and non-productive cough of 4 weeks’ duration, all exacerbated by the supine position. Chest X-ray showed a large left mediastinal mass. Restrictive pulmonary syndrome was evident and echocardiography showed right displacement of the heart and cephalad displacement of the left pulmonary artery with a right ventricular inflow/outflow gradient of 45 mmHg. Caesarean section was planned to allow rapid diagnosis and treatment of the mediastinal mass. Given the double risk of respiratory failure and shock due to elevated pulmonary vascular resistance, an approach with awake (sedation with fentanyl 100 μg and midazolam 5 mg i.v. added to topical naso-oro-pharyngeal anaesthesia) fiberoptic nasal intubation was performed. Anaesthesia was then induced with propofol 100 mg and maintained with end-tidal sevoflurane 1% and fentanyl 50 μg. A single shot of mivacurium 10 mg was administered to facilitate surgery. A healthy male baby was delivered. Intraoperative hypotension (70/50 mmHg) occurred at delivery and resolved with fluid therapy. The patient was transferred to ICU and extubated uneventfully. The mass was diagnosed by CT-guided biopsy as B-cell non-Hodgkin lymphoma.

Discussion: The restrictive syndrome, irritation and partial occlusion of the airways and pulmonary hypertension with reduced tolerance to hypoxia were the problems to face in this case. General anaesthesia seemed preferable to titrated continuous spinal anaesthesia, except for the manoeuvre of tracheal intubation. Fiberoptic intubation with local anaesthesia in the cooperative patient allowed a globally safe procedure.

Reference
P17. UK Registry of high-risk obstetric anaesthesia: outcomes in women with cardiac disease

R Tandon, DP Dob, S M Yentis
Magill Department of Anaesthesia, Chelsea & Westminster Hospital, London, UK

Introduction: In 2001 we reported the first four years' experience of the UK Registry of High-risk Obstetric Anaesthesia (cardiorespiratory disease).1 Siu et al have described a risk index for predicting outcome based on the Canadian experience.2 We aimed to explore whether this risk index might be applicable to UK patients.

Methods: We searched the UK Registry (cardiac; up to 30/9/01) for the presence of the 4 risk factors identified by Siu et al: prior cardiac event/arrhythmia; NYHA > II or cyanosis; left heart obstruction; systemic ventricular dysfunction. Patients were divided according to these factors and their proportions compared with those of Siu et al.

Results: The UK Registry yielded 279 pregnancies compared with 599 in Siu et al's series; 50 (18%) were in patients of NYHA >II compared with 21 (4%) in the Canadian series (all NYHA III). The breakdown of risk factors is shown in the Figure. There were five cardiac deaths in the UK series (1.8%): one with no risk factors and two each for 1 or > 1 risk factors. In Siu et al's series, there were 3 deaths (0.5%), all in the > 1 group.

Conclusions: The UK Registry is a voluntary reporting scheme and lacks both reliable denominator data and cardiac events other than death (e.g. pulmonary oedema) that may not be reported on its forms. However, our comparison does suggest a difference in distribution of risk factors between the two studies and a suggestion that deaths in the UK series might not have been predicted by Siu et al's risk index, although absolute numbers are small. One reason for a discrepancy might be the greater proportion of more severe disease in the UK patients. Further work is needed to explore this prospectively.

References


TML Chan, SM Yentis*, A Holdcroft*
Kings College Hospital & *Chelsea & Westminster Hospital, London, UK

Introduction: A multidisciplinary steering group, including OAA members, set up a prospective study of postpartum headaches in the UK.1 Data gathered included characteristics, contributing factors and management of headaches. We report on restriction of activity associated with postpartum headaches.

Methods: Data were collected throughout 1999. Headaches lasting >6 h and not relieved by mild analgesics were considered clinically significant. Reporting anaesthetists assessed the severity (mild/moderate/severe), postural element (yes/no) and restriction of activity (no problem/managed/impossible). Data were analysed with \( \chi^2 \) or Fisher's exact test, with \( P < 0.05 \) denoting statistical significance.

Results: 975 headaches following anaesthetic interventions were reported; 404 (41%) were considered to be postdural puncture headaches (PDPH). Of these, 91 (23%) were severe and activity was impossible, compared to nine (2%) in the non-PDPH group (\( P < 0.0001 \)). Restriction of activity is shown in Figure 1. 326 PDPHs (81%) had a postural element compared with 67 (12%) of non-PDPH (\( P < 0.0001 \)). Epidural blood patch (EBP) was performed for 82 out of 95 PDPH 'impossible' activity (86%) compared with 2 out of 11 non-PDPH 'impossible' activity (18%) (\( P < 0.0001 \)).

Conclusion: The strong relation between activity and PDPH diagnosis and the performance of epidural blood patch indicates that this factor as well as posture is an important diagnostic criterion.

Reference
P19. Study of platelet and coagulation abnormalities in pre-eclamptic patients

E Hunt, L Homer, JP Mills
Selwyn Crawford Department of Anaesthesia, Birmingham Women’s Hospital, UK

Introduction: Our current practice in patients with pre-eclampsia is to perform a platelet count and coagulation screen. As many of these patients may subsequently request regional anaesthesia before delivery, we aimed to determine whether measurement of both parameters was necessary. We performed a retrospective study of all pre eclamptic patients. Preeclampsia was defined as a diastolic blood pressure of > 20 mmHg from booking in the presence of 1+ or more proteinuria. Data were collected from labour ward and haematology databases.

Methodology: We analysed the labour ward and haematology data of 301 pre-eclamptic patients between March 1998 and April 2000. Information concerning time and date of delivery and mode of anaesthesia were collected. All platelet and coagulation results were within 48 hours before delivery. In all cases the results closest to delivery time were collected. Normal laboratory values were PT = 13 s, APTT = 32 s. Accepted ratios before regional anaesthesia are 1.3 and an platelet count of 100 x 10⁹/L. The notes of all patients with abnormal results were reviewed.

Results: 40 patients had blood results outside the 48-hour rule and were excluded. 261 patients’ blood results were reviewed. 202 (77%) had results within 12 hours before delivery. 205 (79%) had regional anaesthesia. 20 (8%) had results outside the normal range. 37 (14%) had a platelet count result only. One was abnormal. 224 (80%) had both platelet and coagulation results. 19 had results outside the accepted range:

- 7 had low platelets with normal coagulation.
- 4 had low platelets and abnormal coagulation.
- 3 had prolonged APTT but a ratio of < 1.15
- 1 had a PT ratio of 1.38 and a diagnosis of HELLP.
- 8 had normal platelets but prolonged APTT. All ratios were < 1.25.

Conclusion: This study reviewed haematology results of 261 pre-eclamptic patients. Only 20 patients (8%) had results falling outside the accepted range. All patients in this group had an APTT ratio of < 1.25. 12 patients had low platelet counts ranging from 27 to 99, and it was this factor that determined choice of anaesthetic technique. We conclude that it is unnecessary to perform further coagulation studies in the presence of a platelet count within the accepted range.

P20. Thromboelastography (TEG®) changes during pregnancy: a personal view

H Grogan, H Gorton
Leeds General Infirmary, Leeds, UK

Introduction: Pregnancy is associated with a hypercoagulable state, possibly to prevent peripartum haemorrhage. This is brought about by increased concentrations of procoagulants, especially factors II, VII, X and XI and fibrinogen and reduced concentrations of the anticoagulant proteins C and S and antithrombin III. These changes begin in the first trimester and return to normal in the postpartum period. Very little is known about the trends and timing of these changes either using conventional laboratory tests or TEG® analysis. We report the TEG® changes that occurred during the pregnancy of one of the authors.

Methods: Serial TEG® analysis was performed throughout the pregnancy. 0.36 ml of blood was taken via a 22-gauge cannula in the ante-cubital fossa and fresh whole blood was analysed by TEG® using disposable cups and pins within 4 min of venepuncture. Samples were taken once in the 1st trimester, then at 2–3 weekly intervals.

Results: The figure shows a graph of maximum amplitude (MA) plotted against gestation. MA represents final clot strength and is proportional to coagulability.

Conclusion: This single case report shows that TEG® MA increases early in the second trimester illustrating hypercoagulability. There is little change in MA after this time. Further cases are needed to confirm this finding.

References
P21. Obstetric Anaesthesia – Analysis of procedural intervention in a UK District General Hospital

B Seifert, J Onslow
Department of Anaesthetics, Princess Margaret Hospital, Swindon, United Kingdom

Introduction: This study was initiated in order to assess current obstetric anaesthetic practice in our hospital, to ensure patient safety and satisfaction, to provide data on standards of care and to highlight any areas requiring modification.

Methods: Over a one-month period we prospectively recorded every obstetric anaesthetic performed, including time of day, grade of anaesthetist, level of supervision, degree of urgency, the obstetric presentation and any problems associated with administration of the anaesthetic. All patients were followed up to assess analgesia, complications and patient satisfaction.

Results: 262 deliveries took place during this period. Of these 129 (49%) required anaesthesia. A total of 158 anaesthetic procedures were performed, of which 86 (54%) were given out of hours. 107 epidurals were sited (41% epidural rate), 41 (26%) spinal anaesthetics, 2 (1.3%) combined spinal-epidurals, 7 (4%) general anaesthetics and one (0.6%) blood patch were administered. 63% of procedures were performed by a specialist registrar (SpR), 16% by a consultant, 14% by a senior house officer (SHO), 7% by an associate specialist. SHOs were 100% supervised and SpRs had 8% supervision. 17% of procedures were elective, 65% urgent and 18% classified as emergencies. 80 patients presented in labour, 54 presented for caesarean section (21% section rate). The main problem associated with the administration of epidural anaesthesia was incomplete analgesia in 10% of cases. One (0.9%) dural tap occurred. 72% of epidural and 97% of spinal patients felt their pain relief to have been adequate, but 35% of epidural insertions and 38% of spinal insertions were considered painful. Despite this 92% and 97% of patients, respectively, would be happy to undergo the procedure again.

Discussion: This study highlighted that the majority of anaesthetics were being administered ‘out of hours’ by unsupervised SpRs who at the same time covered other areas of the hospital, including ICU, A&E and operating theatres. This suggested that patient care elsewhere was at risk of being compromised and has since been addressed. The high percentage of patients experiencing pain on insertion of epidurals and spinals was surprising and suggests that this area requires further evaluation.

P22. Obstetric anaesthetic data collection – is it worth it?

H de Zoysa, J Durbridge, SM Yentis
Magill Dept. Of Anaesthesia Chelsea & Westminster Hospital, London, UK

Introduction: Data collection is an important component of the obstetric anaesthetic service. Most obstetric anaesthetists participate or have participated in data collection but we were interested in whether anaesthetists thought it was worthwhile.

Methods: A questionnaire was given to anaesthetists currently or recently in our department. They were asked to score the importance of two kinds of obstetric anaesthetic data collection: a) local audits of specific areas of practice and b) routine activity data. Each kind was rated according to importance to the respondent personally, to the Trust, and to obstetric anaesthesia in general, using a scale of 1 (worthless) to 5 (very important). Data were compared using Fisher’s exact test, taking P < 0.05 as statistically significant.

Results: Out of 33 anaesthetists, 30 completed the forms (91%): 12 consultants and 18 trainees (1 SHO, 9 SpR 1–2 s and 8 SpR 3–5 s). There were no significant differences in the scores between the grades (table).

Table. Median (IQR) (range) scores for the importance of specific audits and routine data collection (1–5)

<table>
<thead>
<tr>
<th></th>
<th>Consultants</th>
<th>Trainees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personally</td>
<td>4 (3–4) (2–5)</td>
<td>3.5 (1.5–4) (1–5)</td>
</tr>
<tr>
<td>Trust</td>
<td>4 (4–5) (3–5)</td>
<td>3 (2–5) (1–5)</td>
</tr>
<tr>
<td>Obs anaesthesia</td>
<td>4 (4–4.3) (3–5)</td>
<td>4 (3–4) (1–5)</td>
</tr>
<tr>
<td>Routine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personally</td>
<td>4 (3–4) (3–5)</td>
<td>3 (2–4) (1–5)</td>
</tr>
<tr>
<td>Trust</td>
<td>4.5 (3–4) (2–5)</td>
<td>3 (2–4.8) (1–5)</td>
</tr>
<tr>
<td>Obs anaesthesia</td>
<td>4.5 (3–4) (2–5)</td>
<td>4 (3–5) (1–5)</td>
</tr>
</tbody>
</table>

Discussion: We found wide variation in the importance attached by anaesthetists to obstetric data collection. Consultants scores tended to be higher although this did not reach statistical significance, possibly related to the small sample size. There is a continuing need to educate staff in the importance of data collection.

Reference

P23. Postoperative morphine requirement following the use of intrathecal opioid for caesarean section

R Kumar, H Statham, P Groves
Department of Anaesthetics, Kings College Hospital, London, UK

Introduction: The use of intrathecal opioid (either diamorphine or fentanyl) in spinal anaesthesia for caesarean section has become routine in our institution. By auditing the postoperative requirement of morphine and patient satisfaction we aimed to find out which of the two opioids was superior.

Methods: The audit was conducted over a two-month period. All women undergoing caesarean section under spinal anaesthesia with 0.5% hyperbaric bupivacaine mixed with either diamorphine or fentanyl were studied. Patients were given rectal diclofenac 100 mg at the end of surgery and prescribed our departmental oral analgesia regime of paracetamol 1 g q.d.s and diclofenac 50 mg t.d.s. Morphine 10 mg intramuscularly was prescribed for rescue analgesia. The total morphine used in the 24 h after surgery, maternal satisfaction with postoperative analgesia and side effects were recorded.

Results: 55 women were identified, of whom 28 (51%) had intrathecal diamorphine and 27 (49%) had intrathecal fentanyl. The mean diamorphine dose was 0.24 mg (range 0.2–0.4 mg) and the mean dose for fentanyl was 18.8 μg (range 12.5–25 μg). Data for postoperative morphine requirement is shown below in the table.

<table>
<thead>
<tr>
<th>postop morphine</th>
<th>diamorphine (28)</th>
<th>fentanyl (27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td>21 (75%)</td>
<td>9 (33%)</td>
</tr>
<tr>
<td>one dose</td>
<td>5 (17%)</td>
<td>9 (33%)</td>
</tr>
<tr>
<td>&gt;1 dose</td>
<td>2 (7%)</td>
<td>9 (33%)</td>
</tr>
</tbody>
</table>

Eighty-five percent in the diamorphine group graded their postoperative analgesia as good compared to 70% in the fentanyl group. In the fentanyl group 15% graded their postoperative analgesia as poor compared to none in the diamorphine group. Although pruritus was more common in the diamorphine group, it was mild and well tolerated. No other serious side effects were reported.

Conclusion: As an outcome of this audit diamorphine has become the recommended intrathecal opioid for caesarean section in our unit. We based this on the finding that fewer women in the diamorphine group required intramuscular morphine, thus avoiding all its inherent problems and more women were satisfied with their postoperative analgesia.

Reference

P24. Adequacy of post caesarean section pain relief: a standard too high?

P Ganley, L Power, I Wrench
Royal Hallamshire Hospital, Glossop Road, Sheffield, UK

Introduction: The Royal College of Anaesthetists (RCA) audit guidelines propose the following standards for pain control following caesarean section: 1) Over 90% of women should have a pain score no more than the equivalent of mild. 2) All women should be prescribed NSAIDs unless contraindicated. 3) Over 90% of women should be satisfied with pain management. We have recently introduced guidelines for regular prescription of NSAIDs, use of regional opioids and a subcutaneous diamorphine regime. We wished to find out whether our patients' analgesia met with these important national standards.

Method: Our audit nurse reviewed patients in the first 48 hours following surgery (99 emergency and 76 elective caesarean sections). Details recorded included anaesthetic management, postoperative pain scores (nil/mild/moderate/severe), postoperative analgesia received and satisfaction with analgesic regime (unsatisfactory/fair/good/excellent).

Results: Overall 96% of patients received NSAIDs, 27.5% of patients described their pain as no more than mild at any time and 96% of patients graded analgesia as excellent or good. The results were similar for elective and emergency cases and for patients who had received general or regional anaesthesia. Parenteral opioids were given using the subcutaneous regime for 80% of patients and 115 out of 161 patients (71%) who had regional anaesthesia were given regional opioids.

Conclusion: Our patients reported a very high level of satisfaction with the pain relief that they received following our improvements in analgesia offered. This was despite most patients having pain scores in excess of the RCA standard. To reduce pain scores to the levels recommended would require greater intervention and could result in a higher incidence of potentially serious side effects. We believe that the RCA guidelines for pain scores following caesarean section are too stringent.

Reference
P25. Audit of pain relief following caesarean section
AJ Marsh, CH Laxton
Department of Anaesthesia, St Michael's Hospital, Bristol, UK

Introduction: Regular non-steroidal anti-inflammatory drugs, in combination with paracetamol, with opioids for break-through pain, have been recommended for analgesia following caesarean section.1 Diclofenac 50 mg three times daily and paracetamol 1 g three times daily with codeine 60 mg orally and morphine 10 mg intramuscularly for break-through pain are used in our unit. In this audit we compared the prescription and administration of analgesics, the quality of pain relief produced and maternal satisfaction, against Royal College Guidelines.2

Method: From 13/6/01 to 20/8/01, all women who had delivered by caesarean section were audited. On days one and two following delivery, all women were asked for their worst pain score in the last 24 hours (none, mild, moderate, severe), and whether they felt the analgesia offered was adequate. The presence of side effects was also recorded (nausea, vomiting, itching). Finally, on day three, the drug chart was reviewed to determine the administration of regular analgesia and the use of additional opioids.

Results: 182 women were audited. Regular diclofenac (when not contraindicated), and paracetamol were prescribed in 98% and 100% of women, but only received regularly in 85% and 78% respectively. The results of pain scores and side effects are shown in the table.

<table>
<thead>
<tr>
<th>Table</th>
<th>Pain scores and side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day 1</td>
</tr>
<tr>
<td>Pain mild or none</td>
<td>52%</td>
</tr>
<tr>
<td>Pain moderate</td>
<td>41%</td>
</tr>
<tr>
<td>Pain severe</td>
<td>7%</td>
</tr>
<tr>
<td>Nausea</td>
<td>25%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>19%</td>
</tr>
<tr>
<td>Itching</td>
<td>54%</td>
</tr>
<tr>
<td>Itching requiring treatment</td>
<td>6%</td>
</tr>
<tr>
<td>Pain relief adequate</td>
<td>90%</td>
</tr>
</tbody>
</table>

Conclusions: Pain scores were higher than guideline standards,2 although maternal satisfaction was high. 68% of women received no morphine and 31% received no codeine. Pain scores may be improved by regular administration of analgesia, and by regular oral codeine, possibly at the cost of worsening opioid-related side effects. The incidence of nausea and vomiting may warrant the increased use of antiemetics.

References

P26. An observational study of self-medication of analgesic drugs after caesarean section
PM Snell, MI Bowden, DJ Viira, JP Chilvers
The Selwyn Crawford Department of Anaesthesia, Birmingham Women's Hospital, UK

Introduction: Previous observational studies in our unit have shown that pain relief after caesarean section is often inadequate. A significant finding was the under-administration of analgesic drugs. To overcome this problem, a self-medication programme based on that described by Antrobus,1 whereby selected women are given their own analgesic drugs, was introduced. We have conducted an observational study to evaluate effectiveness, safety, midwife acceptability and maternal satisfaction with this scheme.

Method: 54 women undergoing elective caesarean section under spinal anaesthesia were included in our study. Preoperatively, the women were given verbal and written information about the scheme. Postoperatively, oral morphine, diclofenac and co-dydramol were issued, with instructions about their use. Women recorded their overall pain score for each 24-hour period, using a visual analogue scale (0–100). The incidence of nausea and vomiting were also documented. Maternal and midwifery satisfaction with the scheme was assessed by questionnaires. Protocol violations and women withdrawn from the scheme were recorded.

Results: 4 women were withdrawn from the scheme. 48 out of 50 women completed the questionnaire. The median pain scores on days 1, 2, and 3 were 50, 28 and 21 respectively, (ranges 24–78, 4–74, and 2–80). 10 women suffered nausea or vomiting on day 1 and 4 on day 2. On a scale of 0–10, where 10 is perfect pain control, 33 women rated their pain control 8 or more, 6 rated it at 7 and 11 women were not asked. 20 out of 24 midwives completed the questionnaire. 19 thought that the scheme provided better pain relief than midwifery-administered analgesia and all 20 thought it should continue. Adherence to the protocol improved as the scheme became established.

Discussion: This study has shown that self-medication is effective, safe and associated with a high degree of maternal and midwifery satisfaction. The small number of withdrawals from the scheme may be further reduced by stricter inclusion criteria and patient education. Other factors that may exert an influence on maternal satisfaction after caesarean section, including mobility, sleep, self and baby care, require further investigation.

Reference
P27. Pain relief on the first and second days after caesarean section
EL Brandon, R Russell, J Burry
Nuffield Department of Anaesthetics, John Radcliffe Hospital, Oxford, UK
Introduction: Research on pain relief after caesarean section has focused on the initial 24 hours after surgery with little published on quality during subsequent days. Local audits have demonstrated low pain scores and high satisfaction during the first 24 h, but on the first day after surgery moderate or severe pain was reported on at least one occasion by 90% of women and by 60% on the following day. Consequently several recommendations have been implemented: information leaflets for women, midwifery teaching sessions and agreed pain relief guidelines with prescription of regular rather than as required analgesics.
Methods: Pain relief on the first and second days after surgery was studied prospectively in 50 women delivered by elective caesarean section under regional anaesthesia. Analgesia was prescribed at the discretion of individual anaesthetists. Women were asked to score their pain as nil, mild, moderate or severe at 5 set times during each 24-hour period (08.00, 12.00, 16.00, 20.00, 00.00 h). Anaesthetic technique, analgesia prescribed, time and dose of analgesia received were documented.
Results: Compared with the previous audit (71%) the majority of women (89%) were prescribed regular analgesia with p.r.n. rescue medication. Where there were no contraindications 100% were prescribed NSAIDs. Moderate or severe pain was reported by 98% on at least one occasion, and by 52% for the majority of assessments between 24-48 h. On day two moderate or severe pain was recorded by 80% on at least one occasion, and by 30% for the majority of this 24-hour period. Regularly prescribed analgesia was not received by 87% of women on at least one occasion during the first two postoperative days. Most women (90%) did not receive optimal doses of analgesics.
Discussion: The perception that pain is well managed in the days following caesarean section has not been confirmed. Despite our attempts to improve analgesia, women recovering from caesarean section continue to report significant pain. Optimum analgesic doses are not administered despite the high reported pain scores. Reasons for prescription violation are largely unknown, although comments from women indicated that regular analgesia was not administered. With no improvement in pain scores from the introduction of simple measures, self-administration of analgesics in those women who meet specific selection criteria, will be implemented.1
Reference

P28. An audit of the incidence of nausea, vomiting and pruritus after caesarean section under regional anaesthesia
A Swami, P Sharpe, M Mushambi, A May
Department of Anaesthesia, Leicester Royal Infirmary, Leicester, UK
Introduction: Postoperative nausea, vomiting and pruritus are current problems following the use of intrathecal/epidural opioids for caesarean section. Current research records an incidence of pruritus from 0-100%, severe pruritus 1%, nausea and vomiting 31-65%.1-3 This audit was to determine the incidence of nausea, vomiting and pruritus following caesarean section under regional anaesthesia.
Methods: We audited two techniques of regional anaesthesia for caesarean section. Sixty-eight patients were studied over a 5-month period. One group had spinal heavy bupivacaine 12.5 mg with fentanyl 25 μg for caesarean section with epidural diamorphine 2.5 mg in recovery. The second group had spinal heavy bupivacaine 12.5 mg with diamorphine 300 μg for caesarean section. In both groups hypotension was corrected with boluses of ephedrine 3–6 mg and i.v. fluids. Blood loss and risk factors for nausea, vomiting and pruritus were recorded. Grades of nausea, vomiting and pruritus were recorded intraoperatively, in recovery and postoperatively up to 24 h. Every patient received diclofenac and dihydrocodeine regularly postoperatively. Adequacy of analgesia was assessed by recording patient satisfaction. Severe/moderate nausea/vomiting was treated with cyclizine 50 mg or ondansetron 4 mg. Severe/moderate pruritus was treated with antihistamine and/or propofol.
Results:
Table: intraoperative, recovery and postoperative nausea, vomiting and pruritus

<table>
<thead>
<tr>
<th>Spinal diamorphine (23)</th>
<th>Spinal fentanyl and epidural diamorphine (29)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea</td>
<td>Intraop 14 (61%)</td>
</tr>
<tr>
<td>Recovery</td>
<td>4 (17%)</td>
</tr>
<tr>
<td>Postop</td>
<td>8 (35%)*</td>
</tr>
<tr>
<td>Vomiting</td>
<td>Intraop 1 (4%)</td>
</tr>
<tr>
<td>Recovery</td>
<td>4 (17%)</td>
</tr>
<tr>
<td>Postop</td>
<td>6 (26%)*</td>
</tr>
<tr>
<td>Pruritus</td>
<td>Intraop 7 (30%)</td>
</tr>
<tr>
<td>Recovery</td>
<td>17 (74%)</td>
</tr>
<tr>
<td>Postop</td>
<td>13 (57%)*</td>
</tr>
</tbody>
</table>

*Post op nausea at 24 h P = 0.014.
**Post op vomiting at 24 h P = 0.065.
***Post op pruritus at 24 h P = 0.018.
Conclusion: Incidence of nausea [35%] and pruritus [57%] are significantly increased at 24 h in the spinal diamorphine group. This raises the question whether we abandon the use of intrathecal diamorphine or reduce the dose.
References
P29. Long term audit of satisfaction with epidural analgesia

M Jones, M Dresner
Leeds General Infirmary, Leeds, UK

Introduction: Satisfaction scoring is not highly regarded as an outcome in clinical trials, and its audit will not excite the devotees of evidence based practice. Are the many obstetric anaesthetists who routinely audit maternal satisfaction wasting their time? Between 1997 and 1999, we modified our fixed epidural regimen with three annual reductions in infusion rates. A reduction in satisfaction scores was noted. In mid 2000, a higher infusion rate was therefore reinstated. The results are presented and discussed.

Methods: The Wansbeck Epidural Audit Program was used to collect comprehensive data on all women receiving epidural analgesia since 1997. The midwife and patient satisfaction scale consisted of “excellent”, “satisfactory,” “poor,” and “useless.” Only simple epidurals were studied (no CSEs), each employing 0.1% bupivacaine with 2 μg/ml fentanyl for the loading dose, continuous infusion, and top-ups. In 1997 the infusion rate was 12 ml/h, reducing to 8 and 5 ml/h in subsequent years. In mid 2000 the infusion rate was increased to 10 ml/h, which applied to all of 2001.

Results: Midwife scores were available for 4428 epidurals, and patient scores for 4679. There were no differences in demographics, complication rates, or obstetric outcomes between the years. The proportion of “excellent” scores are shown in the figure.

Discussion: Whilst year on year changes were small, audit revealed an obvious downward trend in satisfaction as infusion rates were reduced. Reverting to a higher infusion rate of 10 ml/h immediately and clearly reversed this trend. We present these data not to champion the cause of high infusion rates for labour epidurals, but to illustrate the value of clinical audit in general, and of satisfaction scores in particular.

P30. Recall and satisfaction with informed consent for epidural analgesia in labour

F McIlveney, K Pollock, L Kestin, J Reid, P Stone
Queen Mother’s Maternity Hospital, Glasgow, UK

Introduction: Debate continues as to whether consent to epidural analgesia during labour constitutes an informed decision. Recall of information given has been shown to be poor. It has been suggested that pain, distress, and the use of opioid analgesia +/- Entonox may affect the validity of consent. We sought to establish whether patients could recall the details of their consent being obtained, and their satisfaction with this process after delivery.

Methods: 50 patients having epidural analgesia during labour were given a standardised explanation of the procedure and risks according to department guidelines. An independent anaesthetist interviewed the patients within 24 hours of delivery. Recall was sought by open then closed questioning.

Results: All patients recalled at least part of the explanation of the procedure and risks. 47/50 (94%) were using Entonox at the time of consent, 38/50 (76%) had received diamorphine 5–10 mg within 4 h. Only in 1/50 was the recall of their consent vague.

Table. Recall of side effects explained

<table>
<thead>
<tr>
<th>Risks/side effects</th>
<th>Unprompted</th>
<th>Prompted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>47/50</td>
<td>50/50</td>
</tr>
<tr>
<td>Epidural failure</td>
<td>41/50</td>
<td>50/50</td>
</tr>
<tr>
<td>Hypotension</td>
<td>9/50</td>
<td>43/50</td>
</tr>
<tr>
<td>Back pain, neural deficit</td>
<td>15/50</td>
<td>22/50, 5/50</td>
</tr>
</tbody>
</table>

92% thought that the correct amount of information had been provided. No patient complained of insufficient information but 8% felt they had received an excessive amount. 86% felt that the information had been imparted at the appropriate time (in labour), but a significant proportion (45%) thought that prior written information would have been beneficial. On prompting, 86% were able to recall three of the main risks explained. No patients experienced a significant complication of epidural insertion.

Conclusions: Despite labour pain and use of multiple analgesics at the time of obtaining consent the vast majority felt they were able to make a clear and informed decision about the procedure and could demonstrate accurate recall of the potential complications discussed. Provision of written information before labour would be useful.

Reference
P31. Complications of regional analgesia in labour: how much information is enough?

N Harper, DN Lucas, M Hegarty,* S Bhuptani,* PN Robinson,* M Cox, SM Yentis
Departments of Anaesthesia, Chelsea & Westminster and*Northwick Park Hospitals, London, UK

Introduction: Regional analgesia is a popular choice for women in labour. We aimed to assess women’s awareness of its potential complications and their perception of risk and to identify how much information they want before consenting.

Method: Following ethical approval and informed consent, 100 postpartum women (50 from each unit) who received epidural analgesia in labour were randomly selected irrespective of parity or mode of delivery. They were given a questionnaire asking about their knowledge of techniques and their complications, their appreciation of levels of risk and what information they thought was necessary to make an informed decision. Data were compared using Fisher’s exact test, with \( P < 0.05 \) denoting statistical significance.

Results: These are shown in the Table. C&W = Chelsea & Westminster Hospital; NPH = Northwick Park Hospital. Knowledge of four complications most often mentioned by anaesthetists \(^1\) are shown.

<table>
<thead>
<tr>
<th>C&amp;W; ( n = 50 )</th>
<th>NPH; ( n = 50 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heard of epidural</td>
<td>47</td>
</tr>
<tr>
<td>Heard of spinal</td>
<td>11</td>
</tr>
<tr>
<td>Heard of CSE</td>
<td>9</td>
</tr>
<tr>
<td>Aware of headache</td>
<td>45</td>
</tr>
<tr>
<td>Aware of hypotension</td>
<td>38</td>
</tr>
<tr>
<td>Aware of failure</td>
<td>39</td>
</tr>
<tr>
<td>Aware of nerve injury</td>
<td>27</td>
</tr>
<tr>
<td>Chosen level of risk†</td>
<td>**</td>
</tr>
<tr>
<td>1:1-1:1000</td>
<td>11</td>
</tr>
<tr>
<td>1:1000-1:1,000,000</td>
<td>25</td>
</tr>
<tr>
<td>&lt;1:1,000,000</td>
<td>14</td>
</tr>
<tr>
<td>Desire for information</td>
<td>***</td>
</tr>
<tr>
<td>All risks</td>
<td>30</td>
</tr>
<tr>
<td>Most risks</td>
<td>13</td>
</tr>
<tr>
<td>Some risks</td>
<td>21</td>
</tr>
</tbody>
</table>

\(*P < 0.02; **P < 0.005; ***P < 0.03.\)

†above which the women felt they should be informed of complications.

Discussion: Most women want to know more about the risks of regional analgesia than is commonly offered. Women in different centres vary in their knowledge and wishes, and this must be taken into account locally when considering the issue of informed consent. Blanket statements issued centrally above which the women felt they should be informed of complications.

Reference

P32. Consent for obstetric epidural analgesia, is it really ‘informed’?

S Sonwalkar, L Hawthorne
Bradford Royal Infirmary, Bradford, UK

Introduction: Obtaining informed consent during labour is difficult because of distressing pain, influence of narcotics and, especially in our region, barrier of language. \(^1\) An audit was conducted to assess the understanding of risk information about epidurals and whether prior knowledge influenced recall. \(^2\)

Method: 100 labouring women gave verbal consent for epidural analgesia after explaining risks according to department policy. Further information was given on patients’ request. For non English-speaking women consent was obtained with the help of an interpreter or English-speaking relative. Women were interviewed postpartum to assess the recall of risks and satisfaction with information given. Antenatal information about epidurals, language spoken, previous epidural and other forms of analgesia in labour were documented. Data were analysed by \( \chi^2 \) where appropriate.

Results: Twenty eight percent of women could not recall any risks. Recall of risks was better in women with antenatal information about epidurals but this was not statistically significant (see table).

<table>
<thead>
<tr>
<th>Number of risks recalled</th>
<th>Antenatal information ((n = 70))</th>
<th>No antenatal information ((n = 30))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>17 ((24.2%))</td>
<td>11 ((36.6%))</td>
</tr>
<tr>
<td>1</td>
<td>19 ((27.1%))</td>
<td>7 ((23.3%))</td>
</tr>
<tr>
<td>2</td>
<td>18 ((25.7%))</td>
<td>8 ((26.6%))</td>
</tr>
<tr>
<td>3 or more</td>
<td>16 ((22.8%))</td>
<td>4 ((13.2%))</td>
</tr>
</tbody>
</table>

Twenty one percent of English-speakers and 50% of non English-speakers failed to recall any risk associated with epidurals. Recall of risk was better if women had had a previous epidural. 13% of women could not recall any discussion with anaesthetists before epidural insertion. Pethidine or Entonox had been given to 86% of women before consent for epidural. Only 5% of women were not satisfied with the information they received and 9% of women were not sure.

Conclusion: Irrespective of race or language, women must receive sufficient information to make an informed decision. Recall of risks was poor indicating the need to reinforce the risk information at every step. The question is how do we improve provision of risk information. Should anaesthetists approach women during antenatal visits or in early labour before the request for epidural is made? Our present practice of consent is not informed.

References

P33. Patient controlled epidural analgesia (PCEA) in labour: how effective is our regime?

M Muammar, TML Chan
Kings College Hospital, London, UK

Introduction: The current PCEA regime used for labour in our unit consists of a basal rate of 6 ml/h and an 8-ml bolus with 30-min lockout. This audit assessed the effectiveness of the current regime using number of patient demands, number of midwife top-ups and patient satisfaction.

Methods: The epidural catheter was inserted and the initial test dose given according to hospital protocol. The PCEA pump (Baxter AP11) was set up using a low dose mixture (0.1% bupivacaine with fentanyl 2 μg/ml) and a standard regime set. A 10-ml bolus of 0.25% bupivacaine was prescribed for breakthrough pain to be given by the midwife. The PCEA pump was disconnected after delivery. The history was retrieved and the total volume infused by the pump, the number of successful demands and the number of attempted demands made by the patient were noted. The number of midwife top-ups was documented. During follow-up visit patient satisfaction, mobility and side effects were assessed.

Results: 70 parturients were audited over a two-month period. 56 women (80%) reported analgesia as good, and none reported poor. The mean total volume of mixture used was 10.94 ml/h (range = 5–22 ml/h) The ratio of successful to total demands was 1:1 to 1:4 in 50 patients (71%). 38 of 62 patients (61%) did not receive any midwife top-ups. 48 of 58 patients (83%) were mobile in bed and did not complain of any side effects. There was also a reduction in the number of times the on-call anaesthetist was contacted because of ineffective pain control.

Conclusion: This PCEA regime has been shown to be effective with good patient satisfaction, few midwife top-ups and mobility retained during labour. Various studies have shown that PCEA settings using a larger bolus and longer lockout interval improve patient satisfaction.1,2 As a result of this audit, we are satisfied and continue with the present regime in our unit.

References

P34. Does walking in labour with regional blockade affect mode of delivery?

C Elton, S Bharmal, AE May on behalf of the COMET study group
University of Birmingham, King’s College, London and Leicester Royal Infirmary, Leicester, UK

Introduction: We have previously shown that combined spinal epidural (CSE) and low dose infusion (LDI) are associated with an increased rate of spontaneous vaginal delivery (SVD) when compared with traditional epidural analgesia.1 We performed a subset analysis of data from this study to investigate the hypothesis that walking in labour increases the chance of a normal delivery.

Method: 1054 primiparous women were randomised to receive one of three epidural techniques. Traditional: 0.25% bupivacaine 10 ml with further 10-ml boluses as required (test dose lidocaine 60 mg). LDI: 0.1% bupivacaine 15 ml containing fentanyl 2 μg/ml followed by an infusion of 10 ml/h of this mixture with 10-ml boluses as required. CSE: intrathecal bupivacaine 2.5 mg and fentanyl 25 μg, followed by 10-15ml boluses of bupivacaine 0.1% with fentanyl 2 μg/ml as required. Mobility was assessed hourly and mode of delivery recorded.

Results: 24% of women in the CSE group and 17% in the LDI group walked at some point in labour. Walking was not associated with an increased incidence of normal delivery.

Table. Type of delivery (%)

<table>
<thead>
<tr>
<th></th>
<th>CSE</th>
<th>LDI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SVD</td>
<td>Non SVD</td>
</tr>
<tr>
<td>Not walking</td>
<td>120</td>
<td>163 (58)</td>
</tr>
<tr>
<td>Walking</td>
<td>30</td>
<td>38 (56)</td>
</tr>
</tbody>
</table>

Conclusion: Increased incidence of normal delivery associated with mobile epidural techniques may not depend on actual mobility achieved.

Reference
P36. The most recent estimation of cervical dilatation at the time of epidural insertion is a poor predictor of time to delivery

R Kaur, D Roman, L Pearce, I Wrench
Royal Hallamshire Hospital, Glossop Road, Sheffield, UK

Introduction: Epidurals are sited throughout labour. Estimation of time to delivery may influence the choice of epidural regime the timing of insertion or even whether or not an epidural should be sited. Cervical dilatation is an important indicator of the progress of labour. We undertook an audit to ascertain whether the most recent estimate of cervical dilatation at the time of epidural insertion was a useful predictor of time to delivery.

Methods: The audit was undertaken by retrospective review of the notes of two hundred patients who had received patient controlled epidural analgesia in labour. The information recorded included the time of epidural insertion, when the baby was born, when the cervix was last examined and what the cervical dilatation was estimated to be.

Results: The time from epidural insertion to delivery was plotted against the most recent estimate of cervical dilatation. There was only a very weak trend towards earlier delivery with increasing cervical dilatation.

Conclusion: The most recent estimation of cervical dilatation at the time of epidural insertion is a poor predictor of time to delivery.

P37. Epidural analgesia: can a painful vaginal delivery be predicted?

D Booth, JE Duggan
Wansbeck General Hospital, Northumberland, UK

Introduction & methods: We have shown previously\(^1\) that among patients with epidural analgesia, vaginal delivery is painful for about 25%. If this could be predicted then this group of patients could be targeted for appropriate treatment. Data from six units using the Wansbeck Epidural Audit System\(^2\) were pooled and analysed. The database contains 18,983 records. We extracted 10,467 cases of vaginal delivery with complete delivery and follow-up data. For the purpose of this study, deliveries rated “uncomfortable” and “painful” were considered painful. We studied the influence of multiple factors on the incidence of painful delivery using multiple logistic regression analysis.

Results: Overall, 25.4% of patients rated delivery as painful. Some raw data are shown in the table.

<table>
<thead>
<tr>
<th>Factor</th>
<th>N</th>
<th>%PD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analgesia in labour ‘failed’</td>
<td>233</td>
<td>77.7</td>
</tr>
<tr>
<td>Analgesia ‘unsatisfactory’</td>
<td>562</td>
<td>67.8</td>
</tr>
<tr>
<td>Epidural abandoned during labour</td>
<td>740</td>
<td>38.8</td>
</tr>
<tr>
<td>Number of top ups &gt;5</td>
<td>505</td>
<td>35.6</td>
</tr>
<tr>
<td>Analgesia in labour ‘satisfactory’</td>
<td>2023</td>
<td>35.0</td>
</tr>
<tr>
<td>Stage of labour &gt; 8 cm at insertion</td>
<td>540</td>
<td>22.6</td>
</tr>
<tr>
<td>Used throughout, no supplements</td>
<td>7724</td>
<td>21.7</td>
</tr>
<tr>
<td>Duration &gt;8 h before insertion</td>
<td>438</td>
<td>19.9</td>
</tr>
<tr>
<td>Analgesia in labour ‘excellent’</td>
<td>7649</td>
<td>18.1</td>
</tr>
<tr>
<td>CSE technique</td>
<td>1052</td>
<td>14.3</td>
</tr>
</tbody>
</table>

Significant predictors for a painful delivery (relative risk (95% confidence interval)) were: analgesia in labour poor (‘failed’ + ‘unsatisfactory’): 7.9 (6.9–9.4); indication maternal distress: 1.7 (1.4–1.9); onset of labour spontaneous: 1.3 (1.1–1.4); <2 top-ups: 0.8 (0.7–0.8); CSE technique 0.6 (0.5–0.7).

Discussion: We found that the most powerful predictor for painful delivery is painful labour. We cannot comment on the management of this problem, but there appears some room for improvement. Interestingly, we found the CSE technique to be independently associated with better analgesia at delivery. However there were some differences between CSEs and epidurals (maternal request 90% v 62%; labour further advanced at insertion) and it is possible this finding results from a sampling error. This finding is worthy of further study by a randomised controlled trial.

References
P38. Audit of epidural anaesthesia for instrumental delivery
H Hartley, J Stone, G Jenkins
Department of Anaesthetics, Royal Surrey County Hospital, Guildford, UK

**Introduction:** Instrumental delivery requires T10 – S5 anaesthesia. Inadequate pain relief during delivery has been described as a pain score ≥30 mm using a 100-mm visual analogue scale. In our delivery suite, the epidural protocol dictates administration of 0.5% bupivacaine 10 ml approximately 30 min before delivery by ventouse or forceps.

**Method:** Seventy-three women having instrumental deliveries in a two-month period were identified. Their notes were reviewed to determine use of epidural analgesia, and the strength and timing of local anaesthetic top-up solution before delivery. Telephone contact was attempted to obtain a verbal pain rating (0–10) for discomfort during delivery.

**Results:** Medical records of 59/73 women were obtained. Verbal pain scores were received from 36, of whom 32 had received an epidural. The majority (71.4%) of top-ups consisted of 0.1% bupivacaine + fentanyl 0.0002%; 7.2% received 0.25% bupivacaine and 21.4% were given 0.5% bupivacaine.

**Discussion:** Despite the predominant use of 0.1% bupivacaine + fentanyl 0.0002% as the epidural top-up for instrumental delivery, median pain scores remained within acceptable limits, provided the top-up was given within 1 hour of delivery.

**Reference**

P39. Definitions in obstetric anaesthesia: what is 'dural tap rate'?
JA Durbridge, SM Yentis
Magill Department of Anaesthesia, Chelsea & Westminster Hospital, London, UK

**Introduction:** Dural tap rate is used as an indicator of quality on labour ward, but this can be calculated in different ways. In addition, post-dural puncture headache (PDPH) could itself be a useful indicator. The numerator may be taken as recognised dural taps, PDPH with or without recognised dural tap, or a combination of these. The denominator can be all regional procedures, or individual regional anaesthetic techniques alone or in combination.

**Method:** The computerised data collection system in our hospital produces a report on recorded dural taps and PDPH. We used this and the number of regional procedures performed to calculate dural tap rates using different numerators and denominators, for the year 2001.

**Results:** During 2001, 1667 epidurals, 666 combined spinal-epidurals (CSEs) and 188 spinals were performed. There were four recognised dural taps of which two developed PDPH, four cases of PDPH without a recognised tap (two following CSE) and two PDPH following spinals. The calculated ‘dural tap rates’ and ‘PDPH rates’ varied considerably according to the numerator and denominator used (table).

**Table.** Details of last epidural top-up before delivery

<table>
<thead>
<tr>
<th>Top-up given for instrumental delivery</th>
<th>No. of women</th>
<th>Median pain score (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None (either no epidural or no top-up within 2 h of delivery)</td>
<td>15</td>
<td>8 (1–10)</td>
</tr>
<tr>
<td>0.5% bupivacaine (10 ml) &lt; 1 h before delivery</td>
<td>6</td>
<td>0 (0–8)</td>
</tr>
<tr>
<td>0.25% bupivacaine (10 ml) &lt; 1 h before delivery</td>
<td>2</td>
<td>1.3 (0–2.5)</td>
</tr>
<tr>
<td>0.1% bupivacaine + fentanyl 0.0002% (20 ml) &lt; 1 h before delivery</td>
<td>13</td>
<td>2 (0–8.5)</td>
</tr>
<tr>
<td>0.1% bupivacaine + fentanyl 0.0002% (20 ml) 1–2 h before delivery</td>
<td>11</td>
<td>3 (0–8)</td>
</tr>
</tbody>
</table>

**Discussion:** When quoting a complication rate it is important that its definitions are standardised, especially when units or individuals' performance is compared. Perhaps this should be taken up by the Obstetric Anaesthetists' Association Audit Subcommittee since guidance for the membership would be useful.
P40. Does ethnicity influence labour analgesia?

S Brayshaw, C Duke, R Sashidaran
The Royal London Hospital, UK

**Aims:** Ethnicity could influence pain threshold, communication and relationships between patients and staff. It may have an influence on the type of analgesia offered and administered. Previous studies in an accident and emergency set-up have confirmed and refuted this observation. We aimed to investigate ethnic differences in analgesic provision and usage during labour.

**Methodology:** We reviewed notes retrospectively of 175 women who delivered over a period of four weeks. We audited the type of analgesia, the time first offered/used, in relation to time admitted in established labour. We excluded women who were delivered by caesarean section. Student t test and $X^2$ test were used for analysis. $^*P <0.05$ was considered significant.

**Results:** The results (means and range or n) are summarised in the table.

<table>
<thead>
<tr>
<th></th>
<th>Asian (n = 94)</th>
<th>Caucasian (n = 51)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (range)</td>
<td>25 years (18–40)</td>
<td>28 years (16–42)</td>
</tr>
<tr>
<td>T to 1st analgesia</td>
<td>74 min (0–600)</td>
<td>55 min (0–415)</td>
</tr>
<tr>
<td>Primips n = 41</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Entonox</td>
<td>31*</td>
<td>15*</td>
</tr>
<tr>
<td>Pethidine</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Epidural</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Multips n = 53</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Entonox</td>
<td>36</td>
<td>14</td>
</tr>
<tr>
<td>Pethidine</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Epidural</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

**Discussion:** There is no ethnic difference in the time to offer or use of analgesia amongst our mothers. Primiparous Asian mothers are more likely to use Entonox as the first type of analgesia.

**References**


P41. Assessing the outcome of a test dose

P Dalal, H Harker, F Reynolds, GO’Sullivan
Anaesthetic department, Guy’s and St Thomas’ Hospital and medical school, London, UK

**Introduction:** Much research has focused on the best test dose to detect accidental i.v. insertion of an epidural catheter, but less on intrathecal (IT) placement, probably the greater risk in the UK. It is often supposed that lidocaine must be used for a quick onset, while test doses are sometimes reported to give false negative results, without complete evaluation. We therefore compared the sensory, motor and sympathetic effects of the same doses of bupivacaine plus fentanyl, given epidurally for analgesia in labour or IT for caesarean section.

**Method:** After ethics committee approval and informed consent, women undergoing elective caesarean section were given spinal anaesthesia with hyperbaric 0.5% bupivacaine 10 mg and fentanyl 20 µg (n = 20); women requesting epidural analgesia in labour were given the same drugs and doses epidurally (n = 10) or 0.1% bupivacaine 10 mL + fentanyl 20 µg (n = 13). The temperature of the great toes, sensory block on the outer ankle (S1), motor block at the ankle and haemodynamic changes were recorded every 2 min for 10 min.

**Results:** See table.

<table>
<thead>
<tr>
<th></th>
<th>Spinal</th>
<th>Epidural</th>
<th>Large vol</th>
<th>Small vol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensory loss (n)</td>
<td>2 min</td>
<td>14/20</td>
<td>0/12</td>
<td>0/10</td>
</tr>
<tr>
<td>Motor block (n)</td>
<td>2 min</td>
<td>18/20</td>
<td>0/12</td>
<td>0/10</td>
</tr>
<tr>
<td>Change in foot temperature from time zero °C</td>
<td>2 min</td>
<td>+1.87</td>
<td>–0.87</td>
<td>0.23</td>
</tr>
<tr>
<td>4 min</td>
<td>–1.6 to +7.0</td>
<td>–1.4 to +0.8</td>
<td>–1.1 to +1.2</td>
<td></td>
</tr>
<tr>
<td>6 min</td>
<td>–0.3 to 9.9</td>
<td>+0.1 to +7.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in foot temperature from time zero °C</td>
<td>6 min</td>
<td>+5.88</td>
<td>–0.07</td>
<td>+0.3</td>
</tr>
<tr>
<td>Range</td>
<td>+2.42 to 10.1</td>
<td>–3.05 to +2.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There was a significant rise in foot temperature only in the spinal group, throughout the 10-min test period, but there was some initial overlap with the epidural patients. In one ‘epidural’ (excluded), a rapid rise in foot temperature was noted immediately, and IT placement was confirmed. In the remainder, motor block was 100% sensitive and specific for IT at 4 and 6 min. A few women in the large volume group had mild sensory block at 4 and 6 min, but none in the small volume. Haemodynamic changes had no discriminative power.

**Conclusion:** Bupivacaine 10 mg with fentanyl is a reliable agent to detect IT placement. Foot temperature is rapid, but motor block more specific.
P42. Number needed to treat analysis of airway mistreatment

R Glassenberg, M Fredericksen
Departments of Anesthesia and Obstetrics and Gynecology, Northwestern University, USA

Introduction: Over the past three decades, dramatic decreases in anaesthetic-related maternal mortality from regional anaesthesia have not been met with similar changes in death rates from general anaesthesia. The incidence of failed intubation remains at 1/250. What proportion of airways should be secured awake to significantly reduce this number? A statistical model is proposed and compared to clinical findings. It assumes two distributions: A: the entire population is susceptible and B: 75% of the failed intubations occur in 15% of the population with short-neck, receding mandible, or pharyngeal swelling.

Methods: The following formulas were used: number needed to treat = 1/(rate of risk reduction). Binomial prob = (p^x q^n-x) n!/x!(n-x)! where: n = number of failed intubations prevented. x = number of successes. p = probability of success. q = probability of failure. p = 0.15 for population A, and 0.75 for population B. These probabilities were compared to the study population of 2100 patients who received general anaesthesia for caesarean section. Following IRB approval in 1985, patients with affected airways were intubated fibreoptically before induction of anaesthesia.

Results: Fibreoptics were used in 16% (353/2100) of all general anaesthetics. When analysed by indication for caesarean section (abruption, cord prolapse, previa), there was no difference in cord gases, Apgar, or need for neonatal resuscitation between rapid sequence and fibreoptic groups.

Conclusion: The incidence of failed intubation over the fifteen year study period fell from 1/250 to 1/2100, P < 0.002, odds ratio = 8.47. The model correctly predicts that by targeting 15% of the population, 6–7 failed intubations were prevented.

P43. The relative media exposure of obstetric anaesthesia

P Jacobs, K Reynolds, S Young
Princess Royal Maternity unit at Glasgow Royal Infirmary, UK

Introduction: Following a recent analysis of medical articles in the media,1 we decided to review the relative coverage of, and attitude to, obstetric anaesthesia, compared with anaesthesia generally in a single source print media archive.

Methods: The archive was the online searchable archive of the broadsheet newspaper The Scotsman,2 with keywords: anaesthetist, anaesthesia and epidural. Each identified article was categorised into: 1) relevant to obstetric anaesthesia, 2) relevant to anaesthesia generally or, 3) spurious or coincidental, e.g. using the term anaesthesia as a metaphor or where an anaesthetist was mentioned in an article in a context outwith the medical profession. Subsequently each article was sub-categorised by tone of the article with respect to anaesthesia, into broadly positive, neutral or negative

Results: The results are summarised in the table.

<table>
<thead>
<tr>
<th>Group</th>
<th>Total</th>
<th>Positive</th>
<th>Neutral</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetric</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>General</td>
<td>16</td>
<td>8</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Spurious</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusion: Articles relating to obstetric anaesthesia accounted for 24% of all “genuine” anaesthetic-related articles in this database. Larger numbers in the sub-groups would be required for valid statistical analysis, but it is interesting that there is a greater preponderance towards negative articles in the obstetric group.

References
2. www.thescotsman.co.uk
P44. TENS, for the treatment of musculoskeletal pain during pregnancy

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Introduction: The treatment of musculoskeletal pain during pregnancy, especially pain associated with sacroiliac and symphysis pubis instability, can be very difficult. The mainstays of treatment for this type of pain are the NSAI drugs, which are contraindicated in pregnancy, while the paracetamol/codeine containing preparations can be inadequate. TENS has been used successfully to treat lower back pain in the non-pregnant population so we wished to observe if TENS could be used safely in a pregnant population, when not in labour.

Methods: Having searched Medline/Embase, Pubmed and the Midirs on-line libraries we could find no references to adverse pregnancy and fetal outcomes associated with the use of TENS in pregnancy. In particular we could not find any reference to TENS inducing premature labour, which is a widely held view. At a meeting between obstetric, anaesthetic and physiotherapy staff we decided to allow the obstetric physiotherapist to use TENS from 30 weeks’ gestation, in the treatment of mothers with persistent musculoskeletal pain, where simple analgesics and postural exercises had failed to control symptoms.

Results: Over a one-year period, 10 women received TENS from 30 weeks’ gestation. The mothers wore the TENS over the lower back. They were advised to wear the TENS initially for 2 h per day, and if it was beneficial after 2 weeks, the mother could increase its use to whatever level she wanted. All felt that there was at least some benefit and all increased the use of TENS beyond the initial 2 h. As far as is possible to tell, there were no adverse pregnancy or fetal outcomes associated with its use. Three women delivered before 37 weeks’ gestation. Two were induced because of their chronic pain and one has an emergency caesarean section due to an abruption, which may have been associated with a fall. The other mothers delivered uneventfully from 38 weeks’ gestation.

Discussion: Although we treated a small number of mothers, we feel that all had benefit with no adverse pregnancy outcome. We feel that the risk of premature labour associated with the use of TENS may have been over-stated. There is even some suggestion that TENS may be beneficial.1 We have been encouraged by our results and continue to use TENS where musculoskeletal pain is difficult to treat. There needs to be continued careful surveillance of the use of TENS in pregnancy so we can accurately quantify if there are any problems with the technique.

Reference