ORAL presentations

1. Analgesia produced by epidural diamorphine is better following caesarean section under spinal anaesthesia than under epidural anaesthesia

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Introduction: Epidural diamorphine has been used for analgesia after caesarean section under both spinal and epidural block. We compared analgesia produced by epidural diamorphine after caesarean section under each type of anaesthesia.

Methods: Elective caesarean section patients (ASA I or II) randomly received either combined spinal/epidural anaesthesia (CSE) with 2.2 ml 0.5% hyperbaric bupivacaine intrathecally (group S), or epidural anaesthesia with 0.5% plain bupivacaine (group E). After surgery diclofenac 100 mg was given rectally and 8 hourly oral diclofenac 50 mg prescribed. Diamorphine 2.5 mg in 10 ml saline was given epidurally at the first request for further analgesia. Co-dydramol tablets and i.m. morphine 10 mg were given if required. Visual analogue pain scores and side-effects were recorded over 24 h.

Results: Data on 32 patients in group S and 26 in group E were analysed. Demographic data were similar between groups. Median pain scores were consistently lower in group S than group E, but after correction for repeated measures analysis this only reached significance at 24 h (Figure). A third of patients in each group required i.m. morphine during the study period. Of these mean (SD) time before morphine was significantly greater (P < 0.01) in group S (12.6 h (5.9)) than group E (6.6 hours (3.1)). Co-dydramol consumption and incidence of side-effects were similar between groups.

Conclusions: The improved analgesia following CSE anaesthesia is another advantage of CSE over epidural anaesthesia alone for caesarean section. Possible mechanisms might include leakage of diamorphine across the dura or a pre-emptive analgesia effect due to more profound spinal block.

References
2. A comparison of intrathecal and epidural diamorphine for postoperative pain relief following elective caesarean section

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Introduction: Although intrathecal and epidural opioids are extensively used to provide postoperative analgesia following caesarean section (LSCS), few studies have attempted to compare equipotent doses of the same opioid via each route. In vivo pharmacokinetic studies of epidural morphine and pethidine show the dural transfer of both drugs to be approximately 3.5%. In vitro studies on drug permeability through meningeal layers have suggested mechanisms of drug transfer dependent on their physicochemical properties. Based on these studies, it is likely that epidural diamorphine will have a dural transfer of 5%. Once within the CSF, the highly lipid-soluble diamorphine (octanol-water coefficient 280 vs 14 for morphine) rapidly penetrates the spinal cord, theoretically reducing potential respiratory depression associated with rostral spread. Our study assessed equivalent intrathecal and epidural doses of diamorphine after LSCS in relation to the duration and quality of postoperative analgesia and the incidence of side-effects. An intrathecal dose of 250 μg diamorphine, a dose known to produce prolonged postoperative analgesia, was therefore compared to an equivalent dose of epidural diamorphine, namely 5 mg.

Method: After ethics committee approval, 50 patients undergoing elective LSCS under regional anaesthesia were randomly allocated to 2 groups. Using a combined spinal epidural technique, all patients received an intrathecal dose of 10 mg bupivacaine, with either 250 μg intrathecal diamorphine in 0.5 ml saline followed by 10 ml of epidural saline (Gp1) or 0.5 ml of intrathecal saline followed by 5 mg epidural diamorphine (Gp2). 100 mg rectal diclofenac was administered after surgery. Postoperative assessments of visual analogue scores (VAS), verbal rating scores (VRS), respiratory rate as well as pruritus and sedation scores were recorded at 1-2 hour intervals for 24 h. The time to first analgesic request and type of analgesic were also noted. Statistical analysis included Students t-test, χ² and Mann Whitney U tests.

Results: The groups were comparable in age, weight, height and parity. There were no significant differences between the groups in duration of postoperative analgesia (mean [SD]: Gp1 = 14.6 h [5.9], Gp2 = 14.2 h [6.3], mean difference = 0.4 h, 95% CI = –2.8 to 4.5, P = 0.65), the quality of analgesia (VAS, VRS), postoperative analgesic requirements or the incidence of pruritus (50% in both groups). However postoperative nausea and vomiting was greater (P < 0.05) in the epidural diamorphine group (24%, n=6) compared to the spinal group (4%, n=1). No patient had respiratory depression or excessive sedation.

Conclusion: 250 μg intrathecal diamorphine provides the same duration and quality of analgesia as 5 mg epidural diamorphine. Although pruritus was similar in the two groups, a higher incidence of nausea and vomiting occurred in the epidural group.

References

3. Assessment of dorsal column function using somatosensory evoked potentials after ambulatory combined spinal epidural analgesia for labour

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Introduction: Combined spinal epidural (CSE) analgesia for labour using low-dose mixtures of local anaesthetic and opioid, offers the advantages of reduced motor block, increased maternal satisfaction and the ability to ambulate. The safety of ambulation after CSE analgesia has been questioned due to impairment of dorsal column function (DCF), as assessed by clinical testing of proprioception and vibration sense. The aim of our study was to analyse the effect of low-dose CSE on DCF using posterior tibial nerve somatosensory evoked potentials (SEPs), allowing changes in DCF to be analysed and quantified to a greater degree than using simple clinical tests. SEPs depend on large diameter limb afferents passing via dorsal column pathways to the thalamus and cortex. Posterior tibial nerve
stimulation at the ankle evokes positive scalp potentials with initial latencies at approximately 40 msec (P40). Compromise of this pathway at the cord or nerve root level will reduce the amplitude and increase the latency of SEPs.

Method: After ethics committee approval, SEPs were measured in 40 pregnant patients at term. Patients in group 1 (n=20) received a CSE for labour analgesia using an intrathecal dose of 2.5 mg bupivacaine with 25 μg fentanyl. Patients in group 2 (n=20), without regional anaesthesia, admitted prior to induction of labour or caesarean section, acted as controls. SEPs in both groups were evoked by stimulating the posterior tibia1 nerve at the ankle with 1/sec, 100 μsec rectangular constant current pulses at a stimulus strength which consistently evoked a twitch in the small muscles of the foot. Scalp potentials were recorded with silver-silver chloride discs applied to the scalp at Fz (reference) and Cz (active) with an amplifier bandwidth of 3 Hz–1 kHz. Averages of 128 potentials were recorded until 2 runs produced identical results. Additional tests in the CSE group included clinical assessment of joint position sense (JPS), vibration sense (VS) and motor power. Statistical analysis included Students t-test.

Results: The groups were comparable in age, weight, height and parity. SEPs demonstrated no significant differences in P40 latency between the CSE and control groups (mean[SD]msec: Group 1 = 39.4 [2.8], Group 2 = 39.2 [2.4]; mean difference = 0.2, 95% CI = -2.0–1.5, P = 0.79). However using simple clinical testing, 25% (n=5) of CSE patients had impairment of JPS and VS. There was no correlation between SEPs and clinical impairment of DCF.

Conclusions: Using the scalp recorded SEPs as a measure of the integrity of the somatosensory pathway from the ankle to the cerebral cortex, we found no differences in P40 latencies after CSE analgesia from that of the control group. Since CSE analgesia for labour is unlikely to result in significant impairment of DCF, ambulation remains a safe option providing full lower limb motor power is present.

References

4. Cricoid pressure improve the view at laryngoscopy

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Introduction: The effect of cricoid pressure on the ease of tracheal intubation is controversial; it may be more difficult, it may be easier if the cricoid cartilage is pushed in an upward (cephalad) direction and bimanual may be no better than single handed cricoid pressure.

Method: Ethics committee approval and consent were obtained. Patients were female, not pregnant and about to undergo elective surgery. After induction of anaesthesia and muscle relaxation we compared the view of the larynx at direct laryngoscopy under six different conditions: no cricoid pressure, standard cricoid pressure and cricoid pressure in an upward and backward direction each on two different pillows. Both pillows were of firm foam rubber 6 cm in height; one had an integral neck support 3 cm above this height. Patients were randomized to the order in which the pillows were used as was the order of the types of cricoid pressure which were blinded by a drape over the neck. Simulated cricoid pressure was practised on weighing scales at 3 kg before each case. After each case the force was reapplied blind and recorded. Each view was graded. Grade one views were assessed by the number of millimetres of vocal cord visible to compare with the other views obtained for that patient.

Results: Fifty women were studied, median age 30 years (range 18–52) and weight 61 kg (range 48–92). The mean force applied to the scales was 3.2 kg (range 2.5–3.7, SD 0.29). We found that 95% of the views at laryngoscopy were grade 1 with too few grade 2 and 3 views for statistical comparison. The probability that no cricoid pressure gives the best view was only 6% (95%CI is 2%–12%). Both types of cricoid pressure applied without neck support were more likely to give a better view than no cricoid pressure (sign test, P<0.01), but when applied in an upward and backward direction it was more likely to give a better view than the standard technique (sign test, P<0.01). Comparing the best view when standard cricoid pressure was applied with and without neck support we found that neck support was best in 9 patients, no neck support in 20 cases and no difference in 21 cases (sign test, P = 0.1).

Conclusions: We have found that cricoid pressure is likely to improve the view at laryngoscopy which is further improved by applying it in an upward and
backward direction. Neck support made no difference.

References


5. Scintigraphic & ultrasound assessment of postpartum gastric emptying of solids

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Introduction During labour and in the immediate postpartum period paracetamol absorption studies have demonstrated a delay in the emptying of liquids from the stomach.1 Using the same technique it has been shown that gastric emptying of liquids returns to normal by 18-24 h after delivery. However, absorption of paracetamol does not correlate well with the gastric emptying of solids or semi-solids from the stomach2 and there is some evidence from ultrasound studies that gastric emptying of solids remains delayed beyond 24 h.3

Methods: With ethics committee approval we recruited 6 women 18-24 h after vaginal delivery and 10 non-pregnant controls. Following an overnight fast the subjects were given 200 ml of porridge labelled with 15 Mbq 99TcO4 Dowex resin and 200 ml of water. Imaging data were acquired in the supine position at 1, 5, 10, 15, 20, 25, 30, 45, 60, 75, 90 and 120 min. The lag phase, time point for 50% emptying (T 50) and gastric emptying rate (ER) were calculated for each group. Ultrasound measurements of the cross-sectional area of the gastric antrum visualized in the midline were taken at 0 (pre-meal), 15, 30, 45, 60, 75, 90 and 120 min. The baseline (B 0) and maximum (M 0) cross-sectional area and time point for 50% reduction in area towards baseline (T 50) are presented for each group. Non-parametric tests were used for statistical analysis.

Results: All six postpartum women were multiparous and one had an instrumental delivery. There were no significant differences in the rate of gastric emptying between the two groups (Table).

Conclusions: The preliminary results of this study show that the rate of gastric emptying of solids appears to return to normal within 18 h of vaginal delivery.

References


6. Intrathecal diamorphine in combination with bupivacaine for anaesthesia for elective caesarean section – a dose-finding study

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Introduction: We report a pilot study of 40 women receiving intrathecal diamorphine 0.2 mg, 0.3 mg, 0.4 mg or 0.5 mg during bupivacaine spinal anaesthesia for caesarean section1 with reference to intraoperative comfort, duration of postoperative analgesia and incidence and severity of side effects.2
Methods. Following ethics committee approval and after obtaining written, informed consent we enrolled 40 patients, ASA grade 1 or 2, 38 weeks gestation or over, presenting for elective caesarean section and requesting regional anaesthesia into this randomized controlled double-blind trial. Patients received either 200, 300, 400, or 500 µg of diamorphine as well as 12.5 mg of 0.5% heavy bupivacaine in a total volume of 3 ml. Established procedures for combined spinal epidurals for caesarean section were followed for all groups. Baseline observations included mean arterial pressure and heart rate; following intrathecal injection the change in these variables and the incidence of nausea and vomiting were noted. Assessment of neural blockade was made for cold, pinprick and touch. An adequate block was assumed with full motor blockade and anaesthesia to touch to T5 bilaterally. Failure to achieve this led to exclusion from the study. Intraoperative visual analogue pain scoring (VAPS) was performed as well as a subjective ‘need for supplementation’ score. VAPS scoring continued until 24 hours postoperatively. Side-effects were noted at each postoperative visit. Sixteen patients were selected to undergo continuous pulse oximetry overnight to look for clinically significant respiratory depression by comparing total time with oxygen saturations below 90% and number of hours with more than 12 minutes below 95%.

Results: There were no demographic or obstetric differences between the groups. The block heights, incidence of hypotension and need for supplemental ephedrine were similar between the groups. Two patients required intraoperative alfentanil supplementation (0.2 and 0.3 mg diamorphine). There was no fetal acidosism discernible in any group as evidenced by umbilical arterial pH. Increasing doses of diamorphine were not associated with prolongation of periods of absolute analgesia (time to VAS > 0) or effective analgesia (time to first request for analgesia) but may be associated with an increased incidence of side-effects such as itch, nausea or vomiting. An analysis of pulse oximetry revealed no significant respiratory depression.

Discussion: In this study, doses of diamorphine up to 0.5 mg intrathecally were free from the serious side-effect of respiratory depression. Larger doses may be associated with a higher incidence of minor side effects. 10% of the patients in the 0.2 or 0.3 mg groups required supplementation and so smaller doses may be less effective. To prove this difference would require 40 patients per group (power of 0.85 at the 5% significance level).

References
1. Abuzaid, Prys-Roberts C, Wilkins D G, Terry D M S. The Influence of diamorphine on spinal anaesthesia induced with isobaric 0.5% bupivacaine. Anaesthesia 1993; 48: 492-495.

7. Epidural diamorphine and clonidine for post caesarean section analgesia

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Introduction: Clonidine can be used alone or in combination with opioids and local anaesthetics to provide or enhance epidural analgesia.1,2 Capogna et al showed that epidural clonidine (75 or 150 µg) added to epidural morphine significantly prolonged postoperative analgesia after caesarean section.3

Method: We have conducted a prospective, randomized, double-blind study comparing epidural diamorphine with epidural diamorphine and clonidine for post caesarean section analgesia. We recruited 40 women having elective caesarean section under spinal anaesthesia using 0.5% heavy bupivacaine. An epidural catheter was inserted using a CSE technique at L2/3 or L3/4. Patients either received 2.5 mg diamorphine in 10 ml of saline or 2.5 mg diamorphine with 75 µg clonidine in 10 ml of saline epidurally after delivery. All patients had 100 mg rectal diclofenac at the end of surgery. Exclusions included patients receiving additional intraoperative analgesia.

Observations included blood pressure, respiratory rate, sedation, visual analogue score (VAS, still and moving), time to first analgesia (TFA), and total doses of paracetamol/dihydrocodeine in first 24 h.

Statistical analysis used Student t Test and Mann Whitney. P < 0.05 was considered significant.

Results: Five patients were excluded from the study because of inadequate data collection, epidural not working, or additional analgesia required intraoperatively. Of the remaining patients there were 17 in the clonidine group and 18 in the control group. There was no significant difference between the groups with respect to age, height or weight. Mean ±SD time to first analgesia was longer in the clonidine group (830±361 min) than in the control group (726±418 min) but this difference was not significant (P = 0.43). VAS (still and moving ) recorded at first analgesia and total paracetamol/dihydrocodeine doses were not different between groups. Two clonidine patients had
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Results: We received 191 replies (74%). Of these 104 units were able to provide some information about dural puncture rates, with the numbers of responders rising year by year. Surprisingly few recorded their LOR techniques. Among those who used LORS, the ADP rate was 0.69% compared to 1.1% with LORA. The rate overall was 0.85% out of 265918 epidurals. The highest recorded rate was 3.6% (an outlier) in a unit with <300 epidurals annually, and the lowest 0.19% in a unit with >1000. Only 32 units recorded headaches following normal epidurals, though this was the commonest type of spinal headache in the authors’ institution.

Conclusion: ADP rates are not fully audited in the majority of obstetric units in the UK. Since accurate patient information is crucial for informed consent, and headache is a common cause for complaint, such audit is surely mandatory and should include ‘spontaneous’ post partum spinal headaches. Though the ADP+headache rate may be under-reported in this retrospective survey, LORS appeared safer than LORA, while evidence from careful prospective audit confirms that rates <1% among trainees are achievable with careful teaching of appropriate techniques.

References

8. Accidental dural puncture rate in UK obstetric practice

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Introduction: Headache following epidural analgesia is the commonest cause of malpractice claims in the USA,1 and of litigation in the UK (personal observation). High rates of accidental dural puncture (ADP) are therefore to be avoided at all costs. Typical spinal headache requiring blood patch may follow an apparently normal epidural. Accurate data collected in three centres where loss of resistance to saline (LORS) rather than to air (LORA) was taught obsessionally to numerous trainees revealed ADP + headache rates of 0.3–0.4%.2 Rates of 2.6%3 and even higher have been reported among American residents, and an informal show of hands at SOAP 1996 revealed many were content with dural puncture rates >1% while the majority used LORA to detect the epidural space. We were therefore interested to discover the practice and ADP rates in those UK centres that kept reliable records.

Method: Consultants in charge of anaesthetic services to all 257 obstetric units in the UK were sent a questionnaire requesting numbers of obstetric epidurals, techniques used to detect the epidural space, numbers of accidental dural punctures with needle and with catheter, numbers of spinal headaches following normal epidural and technique used when dural puncture occurred, in the years 1991 to 1995. Partial data were acceptable but if accurate records were not available respondents were urged not to guess but to tick a box marked ‘No records’ and return the form.

Results: We received 191 replies (74%). Of these 104 units were able to provide some information about dural puncture rates, with the numbers of responders rising year by year. Surprisingly few recorded their LOR techniques. Among those who used LORS, the ADP rate was 0.69% compared to 1.1% with LORA. The rate overall was 0.85% out of 265918 epidurals. The highest recorded rate was 3.6% (an outlier) in a unit with <300 epidurals annually, and the lowest 0.19% in a unit with >1000. Only 32 units recorded headaches following normal epidurals, though this was the commonest type of spinal headache in the authors’ institution.

Conclusion: ADP rates are not fully audited in the majority of obstetric units in the UK. Since accurate patient information is crucial for informed consent, and headache is a common cause for complaint, such audit is surely mandatory and should include ‘spontaneous’ post partum spinal headaches. Though the ADP+headache rate may be under-reported in this retrospective survey, LORS appeared safer than LORA, while evidence from careful prospective audit confirms that rates <1% among trainees are achievable with careful teaching of appropriate techniques.

References

9. The influence of epidural analgesia on the development of new backache in primiparous women: report of a randomized controlled trial

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Introduction: Epidural analgesia has been associated with the development of new long-term backache after childbirth.1 Previous studies have either not been randomized or have relied on questionnaires with a low response rate.2 This randomized controlled trial examines the association of epidural analgesia with the incidence of new long-term backache.
Methods: Following Harrow Ethics Committee Approval, written informed consent was obtained from 806 primigravidae in the later stages of uncomplicated pregnancy. Only women uncommitted to any particular form of analgesia were recruited. On admission to delivery suite in established labour, 164 women declined to be randomized, and 190 women required Entonox only. Of the remaining 452 women, 214 were randomly allocated to receive pethidine 100 mg by intramuscular injection and 238 received epidural bupivacaine 10–15 ml 0.25%, followed by infusion of 0.125% bupivacaine at 10 ml.h⁻¹ with top-ups of bupivacaine 0.25% as required. The management of labour was standardized according to the criteria for the active management of labour.³ Mothers were interviewed 24 h after delivery and were questioned about the presence of backache. A further 6 months after delivery, they were asked to complete a questionnaire about the incidence of new backache. In addition to questions on backache, mothers were questioned about headache, arm ache and leg pain. The incidence of new backache was compared between the two randomized groups on an intention to treat basis using Fisher’s exact test.

Results: Comparing the responses of the two questionnaires, the women do not have a consistent memory of when each problem first developed. Of the women randomized during delivery, 409/452 (90.5%) completed the 6-month questionnaire. Of these mothers 203 (49.6%) had backache either before, during or after pregnancy. The incidence of new backache overall was 29.9% (88/294) with a rate 31.5% (51/162) in the epidural group compared to 28.0% (37/132) in the pethidine group (P=0.6).

Conclusions: Our results suggest that backache after childbirth is common. A prospective randomized trial using a standardized management of labour has failed to show an increased incidence of new backache in association with epidural analgesia in primiparae.

References
Conclusions: There were no significant maternal or fetal haemodynamic changes with any of the three regimes but analgesia was superior in group BF.

References

Poster Presentations
1. Maternal temperature during low-dose epidural analgesia for labour

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Introduction: Maternal temperature increases during labour with conventional epidural solutions by over 1°C after 7 hours. We observed maternal temperature during low-dose epidural analgesia for labour.

Methods: After Ethics Committee approval and informed consent, 28 healthy, aepyrexic women with singleton pregnancies receiving ambulatory epidural analgesia in established labour were studied. After 500-1000 ml of Hartmann’s solution intravenously, a segmental lumbar block at L1-L4 was produced with 15 ml of 0.1% bupivacaine and 50 µg fentanyl, followed by 10 ml 0.1% bupivacaine/0.0002% fentanyl as required.

Urinary and vaginal swab samples were taken for bacterial culture at recruitment. Maternal tympanic temperature was measured every 30 min. Room temperature was also measured.

Continuous data were analysed with paired t-tests using the Bonferroni correction for repeated analyses.

Results: Two women were excluded because of positive microbiology and pyrexia. Of the 26 remaining women studied, 24 were primiparous and 2 were multiparous. Eighteen had spontaneous and 8 had artificial rupture of membranes. The median (range) time from onset of labour to delivery was 15.5 (5.7-77.4) hours, from rupture of membranes to onset of epidural analgesia 9.5 (8.3-31.0) hours and from onset of epidural analgesia to delivery 10 (4.8-22.9) hours.

The median (range) number of low-dose epidural top-ups given was 7 (3-11). No other epidural drugs were given. The mean (SD) starting room temperature was 24.3 °C (1.6) and the room temperature at delivery 24.2 °C (1.5). No significant change in maternal temperature occurred during labour (see Figure).

Discussion: Low concentrations of bupivacaine may have less effect on thermoreceptor pathways than higher concentrations resulting in less inappropriate triggering of heat conservation reflexes. Opioids may also have a direct effect on thermal control. Maternal pyrexia during low-dose epidural analgesia is unlikely to be related to the epidural itself and warrants further investigation as to its cause.

References

2. Are complications of epidural insertion related to the degree of maternal cervical dilatation?

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Introduction: There is conflicting (and unresolved) evidence whether1 or not2 epidural insertion early in labour (< 5 cm cervical dilatation) prolongs labour or increases the surgical delivery rate compared with late insertion. However, other factors may be relevant when considering the optimal time for epidural insertion. Insertion in late labour may be more...
difficult and associated with more complications due to more frequent and painful uterine contractions. To assess this we prospectively audited epidural insertion attempts over 6 months.

Method: Anaesthetists completed a form after each epidural insertion. If more than 1 epidural attempt (= the Tuohy needle passing the skin) was required, a reason was chosen from a checklist which included inadequate positioning, excessive patient movement, failure at one interspace, dural puncture or bloody tap. The adequacy of the epidural including block height, unblocked segment or unilateral block was recorded as well as the mode of delivery. Complications were related to the maternal cervical dilatation at the time of insertion using logistic regression analysis.

Results: A total of 260 epidurals were inserted (see Table). More attempts at epidural insertion were required as cervical dilatation increased ($P = 0.0036$). Difficulties with epidural insertion significantly associated with increasing cervical dilatation included excessive patient movement ($P = 0.0017$, odds ratio for 1 cm dilatation = 1.445) and inadequate patient positioning ($P = 0.048$, odds ratio = 1.299). Dural tap ($P = 0.3302$, odds ratio = 1.192) and bloody tap ($P = 0.3474$, odds ratio = 1.155) were not significantly related to cervical dilatation.

Conclusion: Increasing frequency and intensity of maternal uterine contractions presumably caused the excessive movement and inadequate positioning in the later group. Other complications, including dural puncture, were more common in the later group, although not reaching statistical significance with this sample size. Consideration should be given to siting labour epidurals early to ensure maternal cooperation and to minimize complications.

References


3. Incidence of back pain with 2-chloroprocaine compared with lidocaine after paramedian-approach epidural anesthesia in obstetric patients

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Introduction: The use of 2-chloroprocaine (Nesacaine-MPF) for epidural anesthesia has been associated with severe back pain. There are no reports in the current literature on the incidence of this complication in the obstetrical population. This study was designed to compare the incidence of back pain between the two anesthetic agents, 2-chloroprocaine and lidocaine.

Methods: After institutional review board approval and informed consent, the prospective, double-blind, randomized study was performed on consecutive healthy pregnant patients in active labor. Women with a history of back pain before or during pregnancy, those weighing more than 90 kg, or those with a pre-existing myopathy were excluded. Subjects were randomized by the pharmacy department with a list of random numbers to either 1.5% lidocaine or 2% 2-chloroprocaine for epidural block. The physical appearance of the local anesthetic agents was similar, and both the anesthesiologist and the nurse

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anesthetist caring for the patients were blinded to the assignment of the local anesthetics. Epidural block was performed at L2–L3 or L3–L4 level by the paramedian approach. All participants received an initial dose of 8 ml of either 2-chloroprocaine or lidocaine. Once a T8 sensory level was obtained, a continuous infusion of bupivacaine, 0.125%, and fentanyl, 2 pg/ml, was started at 8–12 ml/h. If additional local anesthetic was needed, the patient received either additional bupivacaine/fentanyl as a 10 ml bolus or 0.25% bupivacaine, 3–5 ml. An investigator interviewed the patients 24 and 48 h after delivery and assessed pain with a visual analog scale from 0, no pain, to 10, worst imaginable pain. Data were analyzed by two-tailed unpaired student t-test and \( \chi^2 \); \( P < 0.05 \) was considered significant.

**Results:** Of 140 patients, complete data were obtained for 127; 67 received 1.5% lidocaine and 60 received 2-chloroprocaine. The two groups did not differ by demographic data. The incidence of back pain 24 h after epidural anesthesia was 11.9% with lidocaine and 20% with 2-chloroprocaine (\( P = 0.21 \)) and 48 h after epidural anesthesia was 9.4% with lidocaine and 10% with 2-chloroprocaine. Moderate to severe back pain occurred in 4.5% of patients who received lidocaine and in 13.3% of those who received 2-chloroprocaine (\( P = 0.146 \)).

**Discussion:** Although the use of 2-chloroprocaine for epidural anesthesia has been reported to increase the incidence of back pain, our study did not demonstrate a statistically significant increase in the incidence of back pain in obstetric patients. Therefore, instead of lidocaine, we recommend 2-chloroprocaine because it has a rapid onset of action, has a good quantity of sensory blockade and it is rapidly metabolized by both mother and fetus.

**References**


4. Obstetric anaesthesia for Asian patients

P. Hughes, M. Dresner, R. P. Prasad

*Obstetric Anaesthesia, The General Infirmary, Leeds, UK*

**Introduction:** Asian women form the largest ethnic subgroup in our obstetric population. We have compared the uptake of epidural analgesia and regional anaesthesia for caesarean section (LSCS) between Asian and non-Asians.

**Method:** Using our 1994 obstetric anaesthesia audit data, patients were separated into two groups; Asians and Non-Asians. Demographics and anaesthetic techniques were compared using the \( \chi^2 \) test with Yates's correction. \( P < 0.05 \) was regarded as significant.

**Results:** Of the 4646 deliveries, 20.4% were by LSCS. The epidural analgesia rate was 39.6%. There were 431 (9.3%) Asian patients.

There were no significant differences between the groups in age, vaginal delivery rate, and LSCS rate. There were fewer primiparas in the Asian group (34.1% versus 41.9%, \( P < 0.002 \)), and the epidural rate was much lower (24.3% versus 41.3%, \( P < 0.00001 \)). The Table shows the regional anaesthesia rates for LSCS.

**Discussion:** The lower epidural rate in Asian women can in part be explained by the greater number of multiparas. This is of no great concern, as epidural analgesia in itself confers no clear safety advantage during healthy labour. However, regional anaesthesia for LSCS reduces risk by avoiding the problems of failed intubation and aspiration. It is therefore worrying that our Asian patients experience a much higher general anaesthesia rate than their non-Asian counterparts. This is particularly so given the disproportionate representation of Asian patients in our failed intubation experience.

The differences in anaesthetic choices between the groups have multiple causes, the investigation of which is difficult and even delicate. It is likely that inadequate exposure to antenatal medical education and poor communication between anaesthetists and Asian patients are the principle culprits. Re-education is therefore our proposed solution, starting with encouraging anaesthetists to abandon language barriers as an indication for general anaesthesia. We have also approached local religious and community representatives of our Asian community, and have consequently been invited to set up public seminars on obstetric anaesthetic topics.

| Table 1 (Poster 4) Percentage of LSCSs performed under regional anaesthesia |
|-----------------|-----------------|-----------------|
|                | Asians          | Non Asians      | \( P \) value |
| Elective LSCS   | 61.3%           | 83.2%           | < 0.005       |
| Emergency LSCS  | 56.6%           | 74.0%           | < 0.02        |
| All LSCS        | 58.3%           | 78.8%           | < 0.004       |
5. Postdural puncture headache (PDPH): easily accessible information for the general practitioner

G. T. Schneider, C. M. Price, E. A. Thornberry
Emsworth Surgery, Emsworth, Hants., and Department of Anaesthesia, Queen Alexandra Hospital, Portsmouth, UK

Introduction: Postdural puncture headache (PDPH) is a well recognized complication of spinal and epidural anaesthesia. Early recognition and management are essential to prevent the serious consequences of no treatment, such as the development of chronic headache, subdural haematoma, convulsions and permanent neurological damage.1,2

Usually a woman is informed after an accidental dural puncture and asked to report any headaches. However, an accidental dural puncture may be missed or, despite treatment, the headache may recur. Therefore a woman may be discharged from hospital without being warned that she may develop a headache or develop it at such a late stage that she may fail to relate the problem to the epidural she received. With early discharge more common, the general practitioner (GP) is increasingly likely to encounter PDPH and will need to recognize it as such in order to take appropriate action. We therefore decided to survey GPs' knowledge of PDPH and its management.

Methods: A postal questionnaire about PDPH was sent to 208 GPs in Portsmouth and the surrounding area. They were asked to answer yes or no to statements related to nine aspects of PDPH as shown in the Table. If unanswered they were assumed to be 'don't know'.

Results: 82 questionnaires were returned giving a response rate of 40%. No-one answered all questions correctly. The overall number of correct responders to each question are shown in the Table.

Table (Poster 5) Summary of correct responders to questionnaire on knowledge of PDPH

<table>
<thead>
<tr>
<th>Category</th>
<th>Correct Responders n=82 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causes</td>
<td>16 (20)</td>
</tr>
<tr>
<td>Timing</td>
<td>8 (10)</td>
</tr>
<tr>
<td>Site</td>
<td>5 (6)</td>
</tr>
<tr>
<td>Character</td>
<td>15 (18)</td>
</tr>
<tr>
<td>Aggravating factors</td>
<td>12 (15)</td>
</tr>
<tr>
<td>Associated symptoms</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Risk factors</td>
<td>4 (5)</td>
</tr>
<tr>
<td>Management</td>
<td>3 (4)</td>
</tr>
<tr>
<td>Consequences of no treatment</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Conclusions: GPs demonstrated poor knowledge of the causes, character and aggravating factors of PDPH and some knowledge of timing, site and associated symptoms. It is therefore possible that they will fail to recognize PDPH. Moreover, there was minimal knowledge about the management and consequences of no treatment of PDPH. We therefore designed a pamphlet for GPs as an aid to diagnosis and treatment and a pamphlet for patients to improve early recognition and management of PDPH.

References

6. Does an antenatal anaesthetic clinic change clinical management?

J. Esmond, M. Dresner, A. Slaymaker
Obstetric Anaesthesia, The General Infirmary, Leeds, UK

Introduction: Antenatal assessment of pregnant women with medical and anaesthetic problems may aid risk management and allow informed consent to be properly obtained. But is there any evidence to support this assertion and thereby justify the necessary investment?

Method: One author audited the first 68 patients seen in our Antenatal Anaesthetic Clinic (AAC). From these data, shown in the Table, the following six representative fictional patients were constructed:

1. spina bifida occulta, cannot remember the level, no X-rays available, requesting epidural analgesia
2. previous lumbar spinal surgery at another hospital, no metal in situ, requesting epidural analgesia
3. chronic lumbar backache and sciatica, requesting epidural analgesia
4. healthy patient requesting a mobile epidural (there is no formal mobile service available)

Table 1 (Poster 6) Referrals to the Antenatal Anaesthetic Clinic

<table>
<thead>
<tr>
<th>Reason for referral to clinic</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic inflammatory back pain</td>
<td>18</td>
</tr>
<tr>
<td>Spinal skeletal deformity</td>
<td>15</td>
</tr>
<tr>
<td>Interested in mobile epidurals</td>
<td>11</td>
</tr>
<tr>
<td>Bad experiences with epidurals or spinals</td>
<td>10</td>
</tr>
<tr>
<td>Miscellaneous worries</td>
<td>7</td>
</tr>
<tr>
<td>Serious medical conditions</td>
<td>5</td>
</tr>
<tr>
<td>Anaesthetic-related anaphylaxis</td>
<td>2</td>
</tr>
</tbody>
</table>
5. multiple sclerosis, requiring caesarean section
6. previous myocardial infarction, requesting epidural analgesia.

The clinic consultant devised management and counselling plans for each as if seen in the clinic. Fourteen anaesthetic trainees experienced in obstetric anaesthesia, but not involved in the AAC, were asked to do the same as if faced with each patient at night with senior cover by a non-obstetric anaesthetist. This is the real situation on many nights in many hospitals. The third author compared the two plans and noted any clinically significant differences.

Results: The reasons for the 68 referrals are shown in the Table.
In the 6 fictional patients, trainee advice differed from the consultant’s in a manner considered to have medicolegal relevance in 45.2%. The trainees’ clinical management plan was significantly different in 29.8% of cases, generally being more conservative.

Discussion: Assuming the consultant’s advice and management plan is the best available, the results suggest that the type of patients seen in our AAC would commonly receive inferior advice and clinical management if not seen antenatally. This illustrates the potential for undesirable clinical and medicolegal outcome in obstetric patients with anaesthetic problems not adequately prepared prior to confinement. The results of this study will be used to encourage early referral by obstetricians and in support of our bid for resources for the AAC.

7. Use of patient-controlled intravenous alfentanil analgesia during labour

A. Q. Dar, R. Wilson, G. Lyons
Obstetric Anaesthesia, St James’s University Hospital, Leeds, UK

Introduction: The most effective form of pain relief for labour is lumbar epidural analgesia (LEA). Absolute contraindications to performing LEA include coagulation disorders and an infective focus near the site of epidural insertion. We describe satisfactory use of intravenous alfentanil patient controlled analgesia (PCA) for two women with these contraindications.

Case history 1: A 21-year-old primipara with chickenpox vesicles over trunk and lower back presented in labour.

Table (Poster 7)

<table>
<thead>
<tr>
<th>PCA Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug: Alfentanil (25 μg in 0.9% saline to a total volume of 50 ml)</td>
</tr>
<tr>
<td>Concentration: 200 μg/ml.</td>
</tr>
<tr>
<td>Loading dose: 500 μg (1 ml)</td>
</tr>
<tr>
<td>Bolus dose: 250 μg (0.5 ml)</td>
</tr>
<tr>
<td>Lockout duration: 5 min</td>
</tr>
<tr>
<td>Background infusion: none</td>
</tr>
</tbody>
</table>

Case history 2: A 32-year-old primipara had a rare haematological disorder, The May Hegglin anomaly, with thrombocytopenia (platelet count 31 x 10^3 ml^-1), who gave a clear history of easy bruising, heavy menstrual periods and increased bleeding after superficial cuts.

In both instances, request for epidural analgesia was refused. Alfentanil iv PCA (see Table) was offered to both with significant patient satisfaction. Both had spontaneous vaginal delivery of healthy infants. One minute Apgar scores were 7 and 9 and five min scores were 9 and 10 respectively. No neonatal resuscitation was needed nor were any episodes of apnoea or bradycardia observed subsequently.

Discussion: Intravenous PCA has not gained widespread acceptance for labour analgesia although it offers an attractive alternative to intermittent intramuscular opioid. Advantages of i.v. PCA in labour include a degree of patient autonomy, a sustained therapeutic plasma level providing better overall analgesia and fewer unwanted side effects.

Pethidine, nalbuphine and fentanyl have been used with no recorded maternal or fetal ill effects. Particular advantages of alfentanil in a PCA system for labour analgesia include its rapid onset, short duration and low fetomaternal ratio. Our experience suggests that i.v. alfentanil PCA can provide safe and acceptable analgesia in labour when LEA is contraindicated.

8. An investigation into maternal attitudes to epidurals for pain relief in labour

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Department of Anaesthesia, Northwick Park Hospital and the Magill Department of Anaesthesia, Chelsea & Westminster Hospital, London, UK

Introduction: Epidural analgesia is widely used in labour, however it is not the choice of all mothers. The aim of this study is to investigate maternal attitudes to
epidural analgesia and to discover any difference between the fears expressed by mothers who chose epidural analgesia for labour and those who opted not to have an epidural.

**Method:** The study was performed at two hospitals, Chelsea & Westminster and Northwick Park. The sample population consisted of primiparous women who had had uncomplicated vaginal delivery. Group 1 (n=56) comprised mothers who had chosen not to have epidural and group 2 (n=73) was made up of mothers who did have epidural analgesia in labour. The subjects were interviewed on the first post-partum day when maternal attitudes to commonly expressed fears regarding epidural analgesia were assessed by a 10 cm visual analogue scale (VAS).

**Statistics:** Demographic data were compared with the unpaired t-test and χ² test and VAS scores (0–10) with the Mann-Whitney (MW) test. \( P < 0.05 \) was considered significant.

**Results:** The groups were of similar demographic make up. Their responses are given in the Table.

**Conclusion:** Clear differences in attitude between the groups are demonstrated. The two most discriminating statements were those regarding getting backache afterwards and detracting from a natural childbirth experience. Epidural analgesia is the most effective form of pain relief available in labour. The principle of mothers having the right to choose is stressed in the Cumberlege report,1 but in order to make a proper balanced choice they need accurate information. This study supports the suggestion that mothers are worrying about the wrong complications.2 Whilst the commonest problems with epidural analgesia are heavy legs, hypotension and post dural puncture headache, the main concerns in the epidural refusing group were having a needle in the back, being permanently paralysed and developing backache. Understanding the concerns and attitudes of mothers as shown in this study will enable health professionals to educate and inform effectively.

**References**


**9. An audit of response times for emergency caesarean section**

D. Craske, I. J. B. Jackson, T. H. Madej, R. G. Wheatley
Department of Anaesthesia, York District Hospital, Wigginton Road, York, UK

**Introduction:** The Obstetric Anaesthetists Association (OAA) recommended minimum standard in fetal emergencies is that the time from informing the anaesthetist to start of surgery should not exceed 30 min. We undertook an audit to ascertain whether our

<table>
<thead>
<tr>
<th>Statement to which the subjects responded</th>
<th>Group 1 (No epidural)</th>
<th>Group 2 (Epidural)</th>
<th>MW P</th>
</tr>
</thead>
<tbody>
<tr>
<td>The thought of a needle in my back</td>
<td>6.5</td>
<td>3.2</td>
<td>0.001</td>
</tr>
<tr>
<td>Getting a headache afterwards</td>
<td>2</td>
<td>1</td>
<td>0.012</td>
</tr>
<tr>
<td>Being permanently paralysed</td>
<td>6.5</td>
<td>2</td>
<td>0.0015</td>
</tr>
<tr>
<td>Getting backache afterwards</td>
<td>7</td>
<td>3</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Not being able to push properly &amp; needing forceps</td>
<td>6</td>
<td>4</td>
<td>0.0295</td>
</tr>
<tr>
<td>Not being able to move around during labour</td>
<td>5</td>
<td>3</td>
<td>0.0184</td>
</tr>
<tr>
<td>Might affect the baby</td>
<td>5</td>
<td>2</td>
<td>0.001</td>
</tr>
<tr>
<td>Takes away from a natural childbirth experience</td>
<td>5</td>
<td>0</td>
<td>0.0003</td>
</tr>
<tr>
<td>Might not work properly</td>
<td>2</td>
<td>1.5</td>
<td>NS</td>
</tr>
<tr>
<td>Painful to put in</td>
<td>5</td>
<td>3</td>
<td>0.0235</td>
</tr>
<tr>
<td>Makes it difficult to pass urine</td>
<td>0</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>Slow to provide pain relief</td>
<td>0</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>May cause drowsiness</td>
<td>1</td>
<td>0</td>
<td>0.0105</td>
</tr>
<tr>
<td>No knowledge about epidurals</td>
<td>0</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>Worried that having an epidural may mean a loss of control</td>
<td>4</td>
<td>0.5</td>
<td>0.0230</td>
</tr>
<tr>
<td>A friend had a bad epidural experience</td>
<td>0</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>Makes labour last longer</td>
<td>2</td>
<td>2</td>
<td>NS</td>
</tr>
</tbody>
</table>
practice fulfilled these guidelines and to highlight avoidable delays.

Methods: For 6 weeks the on-call obstetric anaesthetist was asked to fill in a proforma for every emergency Caesarean section (CS) detailing the time the anaesthetist and senior operating department assistant (SODA) were telephoned, when they and the patient arrived in the anaesthetic room and the time of surgical incision. The reason for CS, the position of the mother, the administration of oxygen and type of anaesthetic were also noted.

Results: Thirty-six questionnaires were completed for a total of 48 emergency CS (75% response rate). The median time from informing the anaesthetist to surgical start was 29 min with a range of 10–85 min. The anaesthetist arrived in a median of 2 min (range 0–5) and the SODA in a median of 10 min (range 0–15). The patient arrived in the anaesthetic room in a median time of 13 min (range 1–30). The median time from arrival of the patient to surgical incision was 18 min with a range of 6–30 (excluding one case where the surgeon was delayed).

Fetal distress was present in 15 cases. Only 20% of these mothers were given oxygen and 60% were turned into the lateral position prior to the arrival of the anaesthetist. There was less delay (median 8.5 min (range 1–15) \( P < 0.05 \) Wilcoxon's rank sum test) bringing these mothers to the anaesthetic room. However, the transfer took 15 min in two cases, while the anaesthetist and SODA took maximum times of 5 and 13 min respectively. On only one occasion was the patient in the anaesthetic room when the anaesthetist arrived. The anaesthetic time was a median of 15 min (range 6–26), one was a general anaesthetic the remainder epidural top-ups or spinals.

Discussion: In York we have a dedicated anaesthetist and SODA on call for obstetrics. The anaesthetist is resident but the SODA has to travel in from home out-of-hours. However, the limiting factor is not the arrival of the SODA but the transfer of the patient to the anaesthetic room. Our delivery ward protocols state that mothers for emergency CS should be transferred to the anaesthetic room as soon as the decision is made and that where fetal distress is present oxygen should be administered and lateral position adopted. We need to investigate further why this is not happening and emphasize the importance of the protocols. It may be beneficial to categorize the urgency of non-planned CS. We are only able to fulfil the OAA recommendations if the time taken to transfer patients is excluded.

10. The effect on obstetric outcome of introducing low-dose epidurals for obstetric analgesia

B. Norman, G. Jenkins
The Royal Surrey County Hospital, Guildford, Surrey, UK

Introduction: Epidural analgesia during labour may increase obstetric intervention rates. The use of low-dose epidurals may reduce this effect by allowing patients to mobilize during labour and push more effectively during delivery. This retrospective study analyses the changes in obstetric outcome following the introduction of low-dose epidurals at our hospital.

Methods: The use of low-dose epidurals (bupivacaine 0.1%, fentanyl 0.0002%, 20 ml bolus hourly as required) and higher-dose epidurals (bupivacaine 0.25% or 0.5%) was recorded for 1994, 1995 and 1996. This was compared with the obstetric outcome for women both with and without epidurals over the same period. The \( \chi^2 \) test for trend was used for statistical analysis.

Results: Between 1994 and 1996 the percentage of women in labour receiving epidural analgesia increased from 34.1–42.4% \( (P < 0.001) \). Of these women the percentage who had a low-dose epidural was 1.8% in 1994, 36.9% in 1995 and 95.8% in 1996. The total number of women in labour per year averaged 2695. Changes in obstetric outcome between 1994 and 1996 are illustrated in the Figure. In patients with epidurals the spontaneous vaginal delivery rate rose (49.6–56.3%, \( P < 0.005 \)) and the instrumental delivery rate fell (39.5–31.0%, \( P < 0.001 \)). There was a small non-significant rise in the emergency caesarean section rate (10.9–12.7%). The outcomes for non-epidural patients, and for epidural and non-epidural patients totalled together,

![Obstetric outcome 1994-96](image-url)
remained relatively constant. Analysis of data for primiparous and multiparous women separately yielded similar results.

Conclusion: The introduction of low-dose epidurals has coincided with an increase in the epidural rate, but no change in the total incidence of instrumental deliveries. In patients with epidurals the incidence of such deliveries has fallen. This supports the hypothesis that low-dose epidural analgesia during labour is associated with a lower instrumental delivery rate than higher-dose epidural analgesia. However the emergency caesarean section rate appears to be largely unaffected.

References

11. An audit of prophylactic epidural saline injection following accidental dural puncture in labour

J. Duguid, P. Stone, J. Reid, J. Thorburn
Queen Mother’s Hospital, Glasgow, UK

Introduction: Dural puncture is a well known complication of epidural analgesia for labour, occurring in 0.5%-1% of cases. Post-dural puncture headache results in 70% or more.1 The headache may be incapacitating and distressing and may increase hospital stay. It may, in addition, be related to a number of more serious sequelae.2 Several conservative measures have been used to reduce the incidence and severity of headache, including high fluid intake, and abdominal binders. Other prophylactic treatments have been described, namely epidural infusion of saline for 24 h or more,3 and epidural bolus of saline.4 Firm evidence of the benefit of such prophylaxis is lacking.

Aim: This retrospective audit examines the efficacy of prophylactic epidural saline bolus in preventing headache following accidental dural puncture during labour.

Method. The management of dural puncture at the Queen Mother’s Hospital has included an epidural bolus dose of 60 ml of preservative-free saline at the end of the labour or operative procedure, after the block has worn off. Over a 6-year period, 1991 to 1996 inclusive, all patients who had epidurals were included in the audit. Information was obtained from the anaesthetic records, patient notes, and computerized data files.

Results: The total number of epidurals was 5926 and the total number of dural punctures 51 (0.86%). The occurrence of headache and the need for epidural blood patch (EBP) are shown in the Table.

Conclusion: In the absence of prophylactic epidural saline treatment, post-dural puncture headache incidence proved lower than expected at 54.5%. Saline prophylaxis reduced further the incidence of headache, and of EBP. This beneficial technique is simple, and less invasive than using prophylactic EBP. We are continuing this prophylaxis and auditing its efficacy.

References

12. Epidural analgesia during labour in Anglia and Oxford

R. Burnstein, J. A. Pickett*
University and *NHS Departments of Anaesthesia, Addenbrooke’s Hospital, Cambridge, UK

Introduction: A survey of all maternity units in the United Kingdom conducted during 19911 revealed that only 78% of units offered a 24-hour epidural service. The average epidural rate was 20%. Epidural

Table (Poster 11) The effect of epidural saline prophylaxis on headache rate

<table>
<thead>
<tr>
<th></th>
<th>60ml saline (n=22)</th>
<th>Prophylactic saline (n=29)</th>
<th>No prophylaxis (n=22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No sequelae</td>
<td>19/22 (86.4%)</td>
<td>3/7 (42.9%)</td>
<td>10/22 (45.5%)</td>
</tr>
<tr>
<td>Headache alone</td>
<td>0</td>
<td>3/7 (42.9%)</td>
<td>3/22 (13.6%)</td>
</tr>
<tr>
<td>Headache + EBP</td>
<td>9/22 (13.6%)</td>
<td>1/7 (14.3%)</td>
<td>9/22 (40.9%)</td>
</tr>
</tbody>
</table>
analgesia was most commonly maintained with intermittent top-ups of 0.25% bupivacaine. More recently combined spinal-epidural analgesia (CSEA) and the use of low-dose bupivacaine-opioid mixtures have been recommended to maintain greater maternal mobility and possibly to reduce the requirements for instrumental delivery. The purpose of this survey was to assess the availability and the current practice of epidural analgesia during labour in the Anglia and Oxford region.

Methods: During December 1996 the 21 maternity units in the Anglia and Oxford region were sent a questionnaire which addressed the above issues.

Results and Discussion Nineteen questionnaires were returned (90%). All maternity units provided a 24-hour epidural service. The number of deliveries per annum ranged from 1400 to 6000. The average epidural rate was 24% [12-34%] and varied with the number of deliveries (see Figure).

Standard epidurals were available in all units. Four units (21%) offered CSEA in addition. For standard epidurals 3 ml of 0.5% bupivacaine was the most commonly used test dose (26%). The most frequent initial top-up was 10 ml of 0.25% bupivacaine (53%). Epidural analgesia was subsequently maintained by intermittent top-ups of bupivacaine alone in seven units (37%), by continuous infusions of bupivacaine and fentanyl in 6 units (32%) and by both methods in five units (26%). One unit (5%) used patient controlled boluses of bupivacaine and fentanyl. Three of the units using continuous infusions aimed to keep mothers mobile. Midwives were the personnel usually involved in the administration of top-ups and in the supervision of continuous infusions. The four units that offered CSEA varied in technique.

Conclusion: All surveyed maternity units offered a 24-hour epidural service. Thirteen units (68%) used concentrations of bupivacaine less than 0.25%. Six units (32%) offered analgesia and mobility.

Table (Poster 13) Demographic data

<table>
<thead>
<tr>
<th>Hb</th>
<th>Platelets</th>
<th>Uric acid</th>
<th>Gestation</th>
<th>Diast BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST</td>
<td>g/dL</td>
<td>yr</td>
<td>x109/L</td>
<td>mmol/L</td>
</tr>
<tr>
<td>mean</td>
<td>11.8</td>
<td>201</td>
<td>1.65</td>
<td>52</td>
</tr>
<tr>
<td>range</td>
<td>10.5-14.1</td>
<td>19-36</td>
<td>1.57-1.75</td>
<td>28-40</td>
</tr>
</tbody>
</table>

13. An assessment of the value of expired carbon monoxide to monitor the severity of pre-eclampsia

P. M. Sanderson, S. M. Kinsella
Department of Anaesthetics, St Michael's Hospital, Bristol Royal Infirmary, Bristol, UK

Introduction: There are currently no readily available non-invasive monitors of progress or severity of the HELLP variant of pre-eclampsia. Haemolysis with increased red cell turnover and haem catabolism is a feature of pre-eclampsia. Catabolism of erythrocytes accounts for 60% of endogenous carbon monoxide (CO) production. Pre-eclamptic women have significantly higher levels of carboxyhaemoglobin (COHb%) than normal pregnant women. Expired CO can be measured at the bedside using a ‘breathalyser’ and this correlates with COHb%. Measurement of expired CO is potentially a useful non-invasive monitor of severity and progress of pre-eclampsia.

Methods: Following ethical approval, 14 pre-eclamptic women were recruited. Each patient’s demographic data, weeks gestation, blood pressure, haemoglobin, platelet count, uric acid and LFTs were recorded (see Table). A smoking history was taken. The expired CO (with derived COHb%) was measured using the Bedfont ‘micro-smokerlyser’. Each patient’s clinical status determined the number of recordings obtained.

Results: In 13 non-smoking pre-eclamptic women the mean expired CO was 2.3 ppm (range 2-4 ppm), and
was equivalent to COHb% <2%. The only smoker had an expired CO of 11 ppm and COHb% of 3%.

Discussion: We failed to demonstrate raised expired CO in the non-smoking pre-eclamptic patients we studied. Screening and early detection of pre-eclampsia may have resulted in recruiting women with mild disease, whereas haemolysis, haem catabolism and CO production may be associated with more severe disease. Further work needs to be undertaken in women with severe pre-eclampsia, particularly those with HELLP variant, to determine whether expired CO levels are a useful monitor of severity and progress of disease.

References

14. Development of a fully computerized system to audit an epidural service: featuring real-time data capture, direct data entry and integral report generator

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Wansbeck General Hospital, Ashington, *Xentec Ltd, UK
An epidural service is ideally suited to an audit system whereby data are directly entered into a database. The system was developed in collaboration with a professional software company, Xentec Ltd. The system accommodates epidural and CSE techniques. Data capture is linked to insertion, delivery and follow-up. A data set was defined for each stage. A feature of the system is generation of the patient record from the data recorded at insertion. Alongside the patient record the system can print individualized data collection forms to assist in data entry at delivery and follow-up. Complications and free-text morbidity reports can be recorded at each stage of data entry. A key feature of the system is the integral reporting generator. Reports can be produced for any specified period, by department and by individual, and give a complete breakdown of activity and performance. Complications and morbidity reports are listed with full patient identification.

The system is written in Visual Basic and all data saved in Microsoft Access format. The system was designed to accommodate users unaccustomed to the use of a computer. The program makes extensive use of task list buttons, drop-down dialogue box (‘pick’ lists) and all Windows conventions to minimize the number of key stokes required to enter data and access program functions. All data entry, apart from patient identification is made by selection from a list of options. The system was designed to be user-configurable. Print options, the content of pick lists and other functions can be configured from a set of system functions. The general user is restricted to data entry operations and access to the report generator and set-up functions is password protected.

The system has been in continuous use in our unit for 15 months. The program itself has proved to be robust and trouble-free. Data entry is simple and quick. Average times for data entry are: insertion < 2 min; delivery < 1 min; follow-up < 1 min. Delivery and follow-up data were entered in 96% and 91% of records respectively.

Audit is a fundamental requirement of an epidural service. All paper-based systems suffer from poor compliance and difficulties in retrieval of information from data stored in paper format. Our solution to this problem is to collect data during the time course of an epidural and enter them directly into a database. Data collection becomes part of the clinical process. Compliance is further guaranteed by generation of the patient record. Linking an automatic report generator to this system of data collection produces a powerful and efficient audit tool. The configurability built into the system makes it both durable and useful to other units. Four other units in the North East have expressed an interest in running the system.