Combined spinal-epidural or epidural analgesia in obstetric analgesia?

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Several studies have noted a faster onset of analgesia in IT-analgesia compared to epidural analgesia (4-8 min vs. 10.4-12 min) (1,2). However, it is not clear if the difference is clinically significant (3). Different failure rates have been reported to the initial IT-analgesia ranging from the 4-5% in several training centers and 0.5% by anaesthesiologists with extensive experience with the CSE-technique. If the IT-analgesia fails, the epidural component nearly always works. An overall success rate of 99.9% has been reported in a specialist care (4). However, a large study made in a London hospital yielded similar re-site and failure rates for epidural and CSE (re-site:1.0% and 0.6%; OR 1.8, 95% CI:0.43-7.6, failure 1.7% and 2.9%; OR 0.78, 95% CI:0.31-1.97, respectively) (5).

Although intrathecal dose of local anaesthetics and analgesics is smaller than the equipotent epidural dose this may not - however - be reflected in lower total dose as IT-lipid soluble opioid may cause acute spinal tolerance. This could increase medication needed during a later phase of labour or after a caesarean section. For example, women undergoing abdominal hysterectomy who receive a large dose fentanyl during induction of anaesthesia have larger opioid requirements after surgery than those receiving a smaller fentanyl dose (6).

There is at least one study suggesting acute spinal tolerance would have clinical significance in analgesia after caesarean section. IT-fentanyl was associated with an increase of postoperative morphine consumption after 6 hours had elapsed from caesarean section by as much as 63% (7). However, the clinical studies do not suggest the acute spinal tolerance would have a significant effect during labour analgesia. The total dose of bupivacaine will be reduced approximately by 30% if CSE is employed instead of epidural analgesia (1,2).

There are no comparative studies confirming that reducing the total dose of local anaesthetics by use of CSE technique would result in less motor blockade. In the study by Kartawiadi et al, “heavy legs” were noted in the CSE group more frequently than in the epidural group (2). In another study, the CSE group had larger motor block than the epidural group at 30 minutes but after that the motor block was similar (8). In a large quality control study, there was no difference in the subjective degree of motor block (5).

Increased risk for post dural puncture headache has been thought to be an inevitable result of dural puncture, especially in the population of young women. However, there was no difference in the rate of headache after CSE, epidural or women receiving no neuraxial analgesia (at home < 2 weeks of delivery headache 10.2%, 11.2% and 14.5%; postural headache 2.0%, 1.3% and 2.6%, respectively) in a prospective cohort study of 1022 parturients (9). Another large study found no difference in blood patches required after epidural and CSE-analgesia (0.4% and 0.8%, respectively; OR 0.54, 95% CI:0.09-2.95) (5).

There are case reports of neural damage associated with both the epidural and the CSE techniques. Due to the fact that these complications are rare, there are no comparative studies concerning the occurrence of this complication. Theoretically, risk of neural damage could be larger with CSE as it is more invasive. Identification of vertebral interspaces is cumbersome. In non-obstetric material, there was only a 27-35% suc-
cess rate by anaesthesiologists when MRI was used to control the identification of the vertebral interspaces (10).

There are at least 13 case reports of cases with severe respiratory depression (11). The risk of respiratory depression appears to be increased by antecedent systemic opioids and sitting position with hypobaric IT-medication (12). The changes in ventilation occur later (10-30 min) than the analgesic response which is consistent with the ascension of lipophilid opioids to the respiratory centers (13,14).

There are case reports concerning foetal bradycardia occurring immediately after IT-analgesia. Clarke et al reported foetal heart rate (FHR) decelerations to 60-100 beats/min lasting as long as 10 minutes in 9 of 30 consecutive patients receiving 50 µg of fentanyl intrathecally. A sudden increase in the uterine tone was suggested to be the mechanism for the FHR change. The evidence presented was weak. Only one of these nine cases had an internal uterine pressure transducer which recorded three contractions in rapid succession with incomplete relaxation between contractions lasting 6-8 minutes after the fentanyl injection (15). A case report by Friedlander et al. describes another case in which there was a significant increase in uterine tone and contractions detected by an intrauterine catheter in place (16).

The biological explanation for the uterine tetanic contraction could be an imbalance in the plasma catecholamine concentration following the sudden decrease of pain intensity. The plasma epinephrine concentration decreases abruptly following the IT-opioid whereas the norepinephrine concentration appears to fall more slowly (17).

Foetal bradycardia is a rare side effect. It is not clearly visible even in large studies. There were eight urgent operations due to sudden fetal bradycardia in the IT-sufentanil group (10 µg) whereas there were no such cases in the I.V. PCA-pethidine group (p<0.01), in the study by Gambling et al. The validity of this finding is questionable due to less monitoring in the pethidine group. Caesarean section rate and wellbeing of the newborn were similar (18). In other studies, there were no FHR abnormalities leading to surgical intervention in 651 parturients receiving variable doses of either sufentanil or fentanyl with or without bupivacaine, intrathecally. However, some cases of transient bradycardia following the intrathecal analgesia were mentioned in some of the reports (13,17,19,20,21,22,23). Foetal bradycardia may also appear following a paracervical block or an epidural analgesia as well as during nonmedicated labour(24).

The analgesic effect of the intrathecal component will make it difficult to detect a catheter that has accidentally entered the subarachnoid space or the intravenous space. Aspiration appears as the best method for testing of the epidural catheter. However, data does not suggest that false-negative aspiration is impossible for a catheter that actually is in an epidural vein (CI 95% for false negative is 0.2-0.4%) (25).

Surprisingly, the smaller total dose of opioid is not reflected in faster gastric emptying. In fact, there seems to be a delay in gastric emptying associated with IT-opioid use (26). However, IT opioids may protect against nausea and vomiting. This has been shown in three studies comparing caesarean section spinal analgesia with or without IT-opioid (27).

Pruritus is the most consistent side effect of IT-opioids. This side effect rarely requires any treatment. There seems to be a dose-response relationship for fentanyl (ED50= 6.9 µg and ED95=16.4 µg, approximately same as with analgesic effect) (13) It can be relieved (from 95% to 36%) by adding local anesthetic to the IT-medication (28).

Most of the harmful side effects have been noted after relatively large doses of IT-opioids. There is an analgesic synergy between IT-opioids and local anaesthetics which does not result in enhanced motor block. For example, combining sufentanil and bupivacaine results in a decrease of the ED50 to one third in sufentanil and to one tenth in bupivacaine dose (in fractions of the single dose ED50 values) (29).

The analgesic effect of IT-fentanyl alone comes with a relatively small dose (ED 50=5.5 µg, ED 95=17.4 µg) (13). There is no additional benefit in terms of duration in increasing the dose above 25 µg (30). If the fentanyl dose is a standard 25 µg there is no other difference between the doses of 1.5 and 2.5 mg of bupivacaine but a longer duration of analgesic effect at early labour (22).
Conclusions

CSE is associated with marginally faster onset of analgesia and lower total dose of local anaesthetics during labour. However, these advantages may be outweighed by the potential risks for foetal bradycardia and respiratory depression. The CSE technique may be a valuable tool for an obstetric anaesthesiologist but its specific indications are still to be determined.

References


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