EXTRACTS FROM THE JOURNALS

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Anticoagulants and spinal or epidural anaesthesia

Drug induced impairment of coagulation may have detrimental effects in the patient receiving central neural blockade. Vertebral canal haematoma is a catastrophic complication, more often associated with epidural catheter use than with any other central nerve block technique. Horlocker and Wedel [1] calculated the risk of spinal haematoma and found a significantly increased incidence in the presence of anticoagulants. Other risk factors included technically difficult punctures sometimes due to anatomical abnormalities of the spinal cord and multiple or bloody punctures.

It is important to notice, that the initial complaint of a patient with a spinal haematoma is not severe radicular pain, but weakness outlasting the anticipated duration of the motor blockade or a new onset of lower limb weakness or numbness. Neurosurgical intervention must be sought immediately because recovery is unlikely if surgery is postponed more than 8h.

To reduce morbidity and mortality due to postoperative thromboembolic complications, patients receive thromboprophylaxis. The safety of major neuraxial anaesthesia in the presence of thromboprophylactic subcutaneous doses of unfractionated heparine was documented by several authors and supported by the fact that until 1996 only five incidences of spinal haematoma had been reported. However, since the beginning of 1990, when low molecular weight heparins (LMWH) were introduced for thromboprophylaxis, there has been an increase in the incidence of spinal haematoma, especially in the USA.

LMWH are highly effective agents which are administered subcutaneously, don't need laboratory monitoring of the anticoagulant response, nor dose adjustment for weight (although therefore a relative overdose could occur in smaller patients). The biological half-life of a LMWH is 4-7 hours, 2-4 times that of standard heparin and LMWH have a low affinity for plasma protein resulting in a greater bioavailability. The current recommended thrombo-prophylactic dose in the USA is 30 mg enoxaparin twice daily, implying with this long half life, no relative safe time for performing a block or removing the catheter. In the USA nearly 40 cases of spinal haematoma have been recorded and a FDA Health Advisory was issued in December 1997. Horlocker and Wedel made the following recommendations in an editorial in Anesthesia and Analgesia [2]:

1) The smallest effective dose of LMWH should be administered. The FDA has recently approved enoxaparin 40 mg once daily, which is in line with European dose schedule. [3]
2) LMWH therapy should be delayed as long as possible with a minimum of 12h and ideally 24 h postoperatively. Again here is a difference with Europe, where patients get their starting dose 12h before surgery. In the USA patients undergo even major surgery on the day of admission. This means that it is not possible to give them the first dose of LMWH 12 h before surgery.
3) Antiplatelet or oral anticoagulant medications should not be given in combination with LMWH because the combination will increase the risk of spinal haematoma.
4) Catheter removal should occur when anticoagulation activity is low, so more than 12h after LMWH administration and more than 4 h before the next dose.

Spinal or epidural anaesthesia before intraoperative systemic heparinization has been shown to be relatively safe when a minimum interval time of 60 minutes is observed between the initiation of the block and subsequent heparinization. The removal of the indwelling catheter is performed only after the complete disappearance of remaining heparin effect.

In general, patients treated with platelet aggregation-inhibiting drugs are no longer seen as problematic in central nervous blockade. However when combined with a form of heparin therapy central nervous blockade should not be performed.

1. Horlocker TT, Wedel DJ. Neuraxial block and low-molecular weight heparine: balancing perioperative analgesia and thromboprophylaxis. Regional Anesthesia Pain Meicine 1998;23(suppl2):164-177

2. Horlocker TT, Wedel DJ. Spinal and epidural blockade and perioperative low molecular weight heparine: smooth sailing on the Titanic (editorial). Anesthesia Analgesia 1998;86:1153-1156

3. Checketts MR, Wildsmith JAW. Editotial II. Central nerve block and tromboprophylaxis-is there a problem? British Journal Anaesthesia 1999;82:164-167

Postoperative shivering

Most patients have lower postoperative core temperatures than preoperative values, especially those who are not actively warmed during their surgical procedure. Anaesthetic agents lower the threshold for shivering by 2-4°C and therefore unwarmed surgical patients usually become hypothermic. Shivering doesn't occur during surgery but, in an attempt to increase temperature, appears postoperatively when the plasma concentration of the anaesthetic agents decreases. The threshold for vasoconstriction is approximately 1° C above the threshold for shivering, hence vasoconstriction precedes shivering. Clinical observations suggest, that shivering is also common during spinal and epidural anaesthesia.

Postoperative shivering may also occur when the core temperature is normal, but the patients thermoregulatory setpoint is increased by fever or by the release of cytokines secondary to activation by surgery. Shivering increases the oxygen demand and can be dangerous, especially in cardiac compromised patients.

Horn et al [1] demonstrated that nonthermoregulatory shivering exists i.e. tremor in patients who were normothermic and had no fever. Electromyographic analysis indicates that tremor, in patients who are normothermic and recovering from isoflurane anaesthesia, differs markedly from the normal 4-8 cycle/min pattern of thermoregulatory shivering. They studied 120 patients undergoing major elective orthopaedic operation. Patients were selected randomly to maintenance anesthesia with isoflurane or desflurane and, on a 1:1 basis, allowed to become hypothermic, whereas normal temperature was maintained in the others. Active warming started just before anaesthesia was induced and was discontinued at the end of the operation. Postanaesthetic shivering was graded by a blinded investigator using a four-point scale. Approximately 50% of the unwarmed patients shivered; 27% of the normothermic patients shivered. The overall incidence of shivering was comparable in the isoflurane and desflurane group which is consistent with previous studies suggesting that the thermoregulatory effects of various volatile anaesthetics are similar.

Numerous drugs have proven effective for the treatment of post-anaesthetic shivering. Grundmann et al [2] studied the effects of pethidine (0.3mg/Kg) and clonidine (2mcg/Kg). Their results were in favour of clonidine (5% shivering) compared with pethidine (25%) and placebo (55%). Heart rate and blood pressure values were lower after the administration of clonide than after pethidine, and significantly lower than after saline. The time between end of surgery and extubation was similar in all groups with an average of 18 minutes. There were no significant differences in the pain scores among any of the groups. Clonidine has peripheral and central effects resulting in lowering bloodpressure, light sedation and some analgesic effect. The effect of clonidine on postanaesthetic shivering is probably due to resetting the threshold for shivering.

1. Horn EP, Sessler DI, Standl T, Schroeder F, Bartz HJ, Beyer JC, Schulte am Esch J. Non-thermoregulatory shivering in patients recovering from isoflurane or desflurane anesthesia. Anesthesiology 1998;89:878-886

2. Grundmann U, Berg K, Stamminger U, Juckenhoferl S, Wilhelm W. Vergleichende Untersuchung von Pethidin und Clonidin zur Prophylaxe des postoperativen Kaltezitterns. Anasthesiol Intensivmed Notfallmed Schmerzther 1997;32:36-42