Use of Ropivacaine for local infiltration analgesia during Total Hip Replacement and Total Knee Replacement at Woodend Hospital, Aberdeen

Background
Enhanced recovery (ER) in orthopaedics is gaining widespread use in total knee replacement (TKR) and total hip replacement (THR).

Kerr and Kohan in 2005 developed a multimodal technique for the control of pain following knee and hip arthroplasty called local infiltration analgesia (LIA) as part of Enhanced Recovery. They used a mixture of Ropivacaine 0.2%, Ketorolac and Adrenaline obtaining a volume of 150-170 mLs for TKR and 150-200 mLs for THR. They limited the maximum dose of Ropivacaine to 300mg (adding saline to obtain the volume) and reduced it further in case of low weight, elderly patients above 85 years and in patients ASA 3 or 4 class.

The recommended maximum dose of Ropivacaine is 3mg/kg with or without Epinephrine. In case of renal impairment the dose should be reduced by 20%. In case of liver disease LA clearance is reduced.

During the last year there were two cases of LA systemic toxicity at our elective orthopaedic hospital related to LIA for lower limb arthroplasty.

Objectives:
The aim of the survey was to look into the current practice of LIA use for THR and TKR at Woodend Hospital, Aberdeen. After finishing the first survey recommendations were made and the survey was repeated after 7 months.

Materials and methods:
Data was collected during a 2 week period between 09/01/2016- 27/01/2016. Over this time period 25 cases of THR and 25 cases of TKR were identified. The patients’ age, gender, weight, BMI, renal and liver function and volume of Ropivacaine 0.2% used in surgery were recorded. The survey was repeated between 01/09/2016- 22/09/2016 including 41 patients, 21 in THR group and 20 in the TKR group.

Results:
In the first survey the notes of 50 patients were examined. 22 Males and 28 Females, age ranging between 47-88 years.

The dose of Ropivacaine ranged from 1.92 to 6.34 mg/kg with a mean of 4.26 mg/kg in the THR group and ranged from 1.78 to 6.86 mg/kg with a mean of 4.39 mg/kg in the TKR group. In the THR group three-quarter of the patients received more than the recommended maximum dose of Ropivacaine, with 88% of the patients in the TKR group. In total, out of the 50 cases, 80% received more than 3mg/kg Ropivacaine.

In the second survey notes of 20 Males and 21 Females were examined, age ranging between 51 and 83 years. The dose of Ropivacaine ranged from 1.66 to 5.71 mg/kg with a mean of 3.11 mg/kg in THR group and from 1.09 mg/kg to 3.4 mg/kg with a mean of 2.69 mg/kg in the TKR group. 50% of the patients received more than 3mg/kg Ropivacaine in the TKR group and 30% in the THR group. In total, 30% of the patients received more than the recommended dose of Ropivacaine.

The maximum recommended dose of Ropivacaine was exceeded in 80% of the cases in data captured within the first leg of snapshot survey and in 39% of the cases within the second leg of the survey conducted at Woodend Hospital. We have had two patients who developed symptoms and signs of toxicity intra-operatively. A study conducted at the Golden Jubilee Hospital Glasgow revealed total Ropivacaine levels reaching the toxic threshold in 2 patients out of 28 in a study looking at patients receiving 400 mg of Ropivacaine administered for LIA (THR).

There are also case reports of systemic LA toxicity using Ropivacaine for regional anaesthesia, where Ropivacaine was used more than 3mg/kg.

A systematic review of RCT investigating LIA for THR and TKR showed no additional analgesic effect of LIA in THR group compared with placebo in trials with low risk of bias when a multimodal regimen was administered peroperatively. The patients we observed with LA toxicity, were both undergoing THR. Our patients were treated appropriately with Intralipid and both made a full recovery, but if the evidence for this technique is poor, it would be difficult to defend if the patients had come to harm.

Conclusion:
There is a need to raise awareness about the hazards related to the current practice of LIA. Active involvement of the anaesthetist when calculating the dose of Ropivacaine was recommended in the team theatre brief at the start of the list after the results of the first survey. This recommendation needs to be embedded in every day practice. The theatre brief should also raise awareness of LA toxicity and improve the safety of this technique. Surgeons should be reminded to inject slowly, and aspirate regularly during the injection. There is still need to improve the safety of practice of Ropivacaine use during LIA in Orthopaedics and this will be followed up with a presentation to the Orthopaedic Department.

References: