Femoral nerve blocks (FNBs) provide effective postoperative analgesia in children undergoing arthroscopic surgery as evidenced by their opioid sparing effects and decreased postoperative pain scores. Increasing local anesthetic concentration in peripheral nerve blocks for adults undergoing orthopedic surgery has shown to be beneficial, increasing block success rate and providing longer duration analgesia. The effect of increasing the concentration of local anesthetic in regional extremity blocks in children remains largely unexplored.

Methods

• Study design: retrospective comparison of patients receiving various concentrations of local anesthetic in a FNB for arthroscopic knee surgery during the period of January 1, 2010 to December 31, 2013 at Nationwide Children's Hospital.
• Inclusion criteria: Patients receiving FNB with ropivacaine 0.2%, bupivacaine 0.25%, or ropivacaine 0.5%
• Exclusion criteria: surgery involving the anterior cruciate ligament repair
• Primary outcome: Total postoperative opioid consumption in intravenous morphine equivalents
• Secondary outcomes:
  1) Pain score on arrival to PACU
  2) Time to discharge from PACU
  3) Time to hospital discharge
  4) Adverse events, including postoperative nausea and vomiting

Results

• Two hundred eighty children and adolescents had complete data on covariates and were included in multivariable analyses (ropivacaine 0.2%; 117 (42%) cases; ropivacaine 0.5%; 81 (29%) cases; bupivacaine 0.25%; 83 (30%) cases).
• Age range was 4 to 22 years. Mean patient age was 14.2±2.9 years with a mean weight of 70.1±25.2 kg
• Median postoperative opioid consumption (mg/kg intravenous morphine equivalents) in the ropivacaine 0.5% group was 0 mg (IQR: 0, 0.04) compared to 0.02 mg (IQR: 0, 0.07) in the ropivacaine 0.2% group and 0.02 mg (IQR: 0, 0.08) in the bupivacaine 0.25% group (p = 0.015).
• Median PACU time: Ropivacaine 0.5% group = 47 min (IQR: 36, 68); Ropivacaine 0.2% = 57 min (IQR: 41, 76); Bupivacaine 0.25% = 55 min (IQR: 35, 80) groups (p = 0.025).

Discussion

In children, increasing local anesthetic concentration has been demonstrated to have several benefits on the effects of truncal peripheral nerve blocks. However, the pediatric literature lacks data on the effects of increased local anesthetic concentration on peripheral nerve blocks for the limbs. Our retrospective analysis demonstrates the safe use and increased efficacy of higher concentration local anesthetic in FNB compared to lower concentration local anesthetic in the pediatric population. Specifically, ropivacaine 0.5% decreased postoperative opioid consumption compared to ropivacaine 0.2% and bupivacaine 0.25% after knee arthroscopy. In addition, earlier PACU and hospital discharges were seen in the ropivacaine 0.5% group versus the other groups. There were no differences in first postoperative pain scores or the incidence of nausea and vomiting. No major adverse events were recorded in any group.

References