Intraoperative Intravenous Ketamine in Addition to Epidural Anesthesia May Decrease Postoperative Opioid Requirement in Pediatric Patients with Median Arcuate Ligament Syndrome

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Background

- Median Arcuate Ligament Syndrome (MALS), also known as celiac artery compression syndrome, is a condition characterized by chronic abdominal pain. This is due to compression of the celiac artery and celiac ganglion by the median arcuate ligament.
- Signs and symptoms include abdominal epigastric pain worsened by meals, anorexia, weight loss, and exercise intolerance. Diagnosis is of exclusion, and decompression of the celiac artery is the general treatment.
- Pain is hypothesized to be ischemic and neuropathic in nature.
- Ketamine is commonly used in chronic pain and sedation in the practice of anesthesia. It primarily acts as an antagonist of the NMDA receptor. Previous studies have shown that NMDA receptor antagonists potentiate the effects of opioids and local anesthetics.
- Ketamine has previously been used in combination with epidural analgesia in adults and has shown superior analgesia.

Objective

- To assess the effect of intraoperative ketamine administration on post-operative pain in pediatric patients receiving epidural analgesia after laparoscopic relief of MALS.

Methods

- We retrospective reviewed the charts of 39 patients under the age of 18 who underwent laparoscopic MALS release between February 2014 - August 2016.
- 23 patients had an epidural placed preoperatively at T7 – T8 and general anesthesia. Patients received patient controlled epidural analgesia (PCEA) with bupivacaine 0.1% and clonidine 0.5 mcg/ml postoperatively.
- Ketamine intraoperatively was given as a 0.5 mg/kg bolus at incision, and a 3 - 8 mcg/kg/min infusion until skin closure.
- Postoperatively, patients received either IV push or PCA narcotics.
- We evaluated daily opioid requirements in IV morphine equivalents and normalized it to patients weight (mg/kg/day).

Results

- Of the 39 patients evaluated, 16 patients received epidural analgesia only (EO) and 5 patients received epidural analgesia and intraoperative ketamine (EK).
- There was no statistical difference in age, gender, BMI, duration of chronic pain, preoperative pain scores and opioid use, and the time of epidural catheter removal between the two groups.
- In the EK group, there was a statistically significant difference (p=0.04) in the opioid requirement between postoperative day (POD) 1 (0.12 +/-0.21), and POD 2 (0.28 +/-0.33).
- In the EO group, the difference between the opioid requirement on POD1 and POD2 was not statistically significant.
- The average opioid requirement was less in the EK group than EO group on the POD 1, 2, and 3, with the largest effect being noted on POD1 (0.12 mg/kg vs 0.31 mg/kg), however the difference did not reach statistical significance.

Conclusion

- Ketamine works primarily by noncompetitive inhibition of the NMDA receptor in the CNS and spinal cord and has previously been demonstrated in adults to synergistically work with epidural analgesia.
- Our study shows that in pediatric patients with MALS intraoperative ketamine in addition to epidural analgesia provides significantly better pain relief, with the most pronounced effect on POD1.
- Further studies are needed to validate these results, and to determine whether the continuation of the ketamine infusion postoperatively offers additional benefit.

References