[GA1-44] The Impact of Anesthetic Techniques on Emergence after Major Spine Surgery in Children and Young Adults

Hopkins C, McClain B, Yue P, DeBoard J
Saint Louis University , St. Louis , MO, USA

Introduction

Pediatric scoliosis surgery carries a small risk of neurologic damage. This risk has been shown to be greatly decreased, but not eliminated by intraoperative neuromuscular monitoring1. Thus, rapid reanimation and neurological examination remains an important component in preventing a permanent deficit. A propofol–remifentanil TIVA technique has been shown to successfully facilitate rapid extubation and reanimation2. NMDA receptor activation and hyperalgesia related to prolonged remifentanil infusions detract from the benefits of expedited neurological exam and possibly increase postoperative narcotic requirements. Concurrent administration of an NMDA blocking agent may reduce these risks, but hyperalgesia prevention with ketamine infusion has had mixed results3,4.

We retrospectively investigated if addition of low dose ketamine combined with propofol improves rate of reanimation for neurological exam while limiting remifentanil-induced hyperalgesia.

Methods

With IRB approval we retrospectively reviewed spinal fusions performed at our institution. 89 patients were identified. 32 patients were removed due to neuromuscular scoliosis, or trauma as surgical indication. 1 case was removed due to an incomplete anesthetic record. 38 patients who received no ketamine were placed in a control group. The treatment group consisted of 18 patients who had received a propofol, remifentanil, and ketamine(< 10 mcg/kg/min) TIVA anesthetic.

Results

Both groups were similar in age, wt, gender, surgical duration, and levels of vertebral correction. The ketamine group had a significantly lower time to PACU (14.2 vs. 31.9 min), UMSS (0.78 vs. 31.2), 1st PACU pain score (0.56 vs 3.0), and 24 max pain score (5.3 vs 6.9) at $p \leq 0.01$. 2nd pain score (1.2 vs 2.6) and PACU stay (71.6 min vs 85.7 min) trended toward being improved but were not significantly different.

Conclusions

Our results indicate that a remifentanil–propofol TIVA with low dose ketamine can provide rapid recovery from anesthesia, allowing for an expedited neurologic exam without remifentanil-induced hyperalgesia. Mu receptor binding by ketamine occurs at anesthetic doses and does not explain the witnessed reduction in pain score at our low doses. NMDA receptor antagonism may play a role in neuro-cognitive function. More research is indicated regarding the benefits of ketamine for rapid extubation and neuroexamination.

1.Bridwell et al. Major intraoperative neurological deficits in pediatric and adult spinal deformity patients: Incidence and etiology at one institution. Spine 1998; 23:324-331.
2.Imani et al. Propofol–alfentanil vs propofol–remifentanil for posterior spinal fusion including wake-up test. Brit J of Anaesth 96 (5): 583–6 (2006)
3.Engelhardt et al. Intraoperative Low-Dose Ketamine does not prevent a remifentanil-induced increase in morphine requirement after pediatric scoliosis surgery. Pediatr Anesthesiol 2008, 107 (4): 1170-1353.
4.Parikh et al. Preventive analgesia: Effect of small dose of ketamine on morphine requirement after renal surgery; J Anaesthesiol Clin Pharmacol. 2011 Oct-Dec; 27(4): 485–488
5.Autry et al. "NMDA receptor blockade at rest triggers rapid behavioural antidepressant responses". Nature July 2011; 475: 91–95.
