

A Case Series of Patients Undergoing Posterior Spinal Fusion Who Had Placement of an Elastomeric Pain Relief System with Lidocaine for Postoperative Analgesia

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Introduction: Posterior spinal fusion (PSF) for congenital and idiopathic scoliosis is associated with intense postoperative pain, for which a variety of analgesic techniques have been applied (1). Continuous local anesthetic wound infiltration appears to represent an alternative to a continuous infusion of a local anesthetic and/or opioid via a surgically placed epidural catheter (2). The ON~Q® Pain Relief System (I-Flow Corporation, Lake Forest, CA) is an FDA-approved device for continuous infiltration consisting of an elastomeric infusion pump, extension tubing with a capillary flow-restrictor, and a multi-orifice implantable catheter of varying length. We report a series of three patients who received postoperative analgesia after PSF with an ON~Q® Pain Relief System and who developed elevated serum lidocaine levels despite appropriate infusion rates.

Methods: As part of our Pediatric Anesthesia Pain Medicine Service continuous quality improvement (CQI) effort, three patients were noted to have developed elevated serum lidocaine levels (> 5.0 mcg/ml) during their routine postoperative care after PSF, while receiving lidocaine via the ON~Q® Pain Relief System. After Institutional Review Board approval, the medical records of these three patients were abstracted. A series of analgesic and side effect parameters were noted.

Results: Of 34 patients who received lidocaine via an ON~Q® Pain Relief System after PSF between January 2006 and October 2006, three (8.9%) developed elevated serum lidocaine levels. All three of these patients received 4 ml/hr of 2% plain lidocaine via two 10 inch multi-orifice catheters, which were placed in the wound prior to skin closure and in turn connected to a 400 ml elastomeric reservoir. The three patients also received patient-controlled analgesia (PCA) with hydromorphone and intermittent diazepam for anxiety and/or muscle spasms. All three patients reported excellent postoperative analgesia and utilized modest amounts of hydromorphone via PCA. While persistently drowsy, all three patients were easily arousable and exhibited a normal mental status. None of the three patients reported perioral tingling (parathesia), a metallic taste, or tinnitus. None exhibited abnormal motor activity, seizures, or cardiac arrhythmias.

Age (yr)	Weight (kg)	Lidocaine Dose (mg/kg/hr)	Lidocaine Level (mcg/ml)	Elapsed Time (hrs)*	PCA Dose (mcg/kg/hr)†	Pain Score¶ (0-10 scale)
15	75	1.07	5.2	45.5	1.98	3.07
13	66	1.21	5.1	59.5	0.80	3.14
17	54	1.48	5.6	44.0	2.09	2.58

* Elapsed time from the initiation of the ON~Q® Pain Relief System until the maximum serum lidocaine level

† PCA dose of hydromorphone during the ON~Q® infusion

¶ Mean pain score while during the ON~Q® infusion

Discussion: In the three patients reported here, elevated serum lidocaine levels were associated with marked analgesia based on low pain scores and minimal PCA requirements. No significant or unusual side effects were noted. When administered as a continuous intravenous infusion, lidocaine has been reported to enhance postoperative analgesia (3) and to provide relief of refractory pain in terminally ill pediatric cancer patients (4). This raises the thought-provoking question as to whether a continuous

wound infiltration of lidocaine or any amide local anesthetic works in part by a systemic mechanism of action. If so, then valid consideration might be given to a continuous intravenous infusion of lidocaine as part of the postoperative analgesic regimen after pediatric PSF. More problematic is the potential for the unrecognized serum accumulation of lidocaine, ropivacaine or bupivacaine when using such an elastomeric pain relief system. The results of this small number of patients reinforce the need to monitor serum lidocaine levels. Alternatively, the administration of the ester 2-chloroprocaine would eliminate any concern of serum accumulation of local anesthetic.

References:

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- 3) Koppert W. et al. *Anesth Analg.* 2004;98(4):1050-5
- 4) Massey G.V. et al., *J Pediatr Hematol Oncol.* 2002;24(7):566-8