TITLE: A Laboratory Model for Measuring Spinal Axis Spread of Epidural Opioids

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Durant and Yaksh have described a model for measuring spread of epidural opioids in dogs using surgically implanted catheters in tracheotomized dogs (1). We describe a method of percutaneously placing catheters in the lumbar epidural and subarachnoid spaces as well as in the cisterna magna.

After approval of our animal review board, a canine cadaver was dissected to examine the atlanto-occipital joint and the lumber interspaces. 6 short haired mongrel dogs (20-25 kg) were anesthetized with thiopental 15 mg/kg and the animals' tracheas were intubated. The dog spontaneously breathed halothane/02. Under fluoroscopic guidance a 17 G Tuohy needle was inserted with the bevel directed cephalad into the epidural space at L6/L7 or L7/S1 using a modified paramedian approach and loss of resistance (LOR) to 0.9% NaCl.

A 2nd Tuohy needle was inserted with the bevel directed caudad at the atlanto-occipital space using a midline approach and LOR to 0.9% NaCl. Cerebral spinal fluid (CSF) could be aspirated as soon as LOR was detected. Under fluoroscopic guidance, styletted 20 G epidural catheters (Abbott) were then inserted and advanced caudad through the cervical needle and cephalad through the lumbar needle until the tips of both catheters were positioned opposite each other in the lumbar region. A 3rd Tuohy needle was inserted at the atlanto-occipital space with the needle directed cephalad. A 20 G epidural catheter was advanced 3 cm past the needle tip into the cisterna magna. Catheters were secured in place using a clear plastic dressing. CSF aspirated from the catheters was replaced ml for ml with 0.9% NaCl. A 20 G catheter was placed in a femoral artery for sampling of blood and blood pressure monitoring.

CSF could be freely aspirated from both intrathecal catheters for at least 3 hours. By application of a plaster cast, the lumbar intrathecal and epidural catheters could be left in place for 24 hours after anesthesia.

After injection of an epidural opioid, CSF and plasma samples can be drawn and opioid levels measured. This model allows measurement of dural penetration and CSF migration of epidural opioids. Using a percutaneous method, catheters can be inserted and the experiment done on the same day.

1. Anesth Analg 1986;65:583-92.

TITLE: EVALUATION OF CONTINUOUS EPIDURAL FENTANYL/BUTORPHANOL INFUSION FOR POSTOPERATIVE PAIN

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Epidural analgesia is a popular technique for managing postoperative pain. While many different narcotics have been utilized, side effects such as nausea/vomiting, pruritis, urinary retention, and sedation often limit therapy. We have used continuous epidural infusions of fentanyl/bupivacaine (F/B) which offers an excellent analgesic profile with minimal side effects. Recently, the combination of epidural morphine with butorphanol has been shown to reduce the incidence of side effects when compared to morphine when using a bolus epidural technique.[1] This study was undertaken to evaluate the efficacy of analgesia and compare the incidence of side effects between F/B and Fentanyl/Butorphanol/Bupivacaine (F/B/B) when used as continuous epidural infusions.

53 consecutive patients receiving continuous epidural narcotic/local analgesic solutions were studied. 22 patients randomly received epidural F/B/B (.001%/.06%/.1%), and 31 epidural F/B (.001%/.1%). Infusions were begun intraoperatively and continued for up to 48 hours postoperatively. Analgesia was assessed using a visual analog scale (VAS). Side effects evaluated included: nausea/omiting, pruritus, urinary retention, and sedation. Data was analyzed using the Mann-Whitney U-test and χ^2 ($p < 0.05$).

Pain scores assessed by the VAS were similar between both groups on both postoperative days. Infusion rates of the narcotic solutions were also similar. There were no differences in the incidence of nausea/vomiting, or urinary retention between groups. However, significantly more patients receiving F/B/B were sedated on the first postoperative day, compared to those receiving F/B. While not significantly different, pruritis was less in patients receiving F/B/B.

	F/B		F/B/B	
Age (years)	41±18		48±21	
Gender (% males)	19.4		27.3	
POSTOPERATIVE DAY	1	2	1	2
Infusion rates (ml/hr)	6.1±1.8	5.6±2.5	6.2±2.3	6.6±2.4
Pain Score (VAS)	2.2±2.3	3.4±2.9	3.6±3.4	3.0±3.0
Nausea/Vomiting (%)	3.2	0	9.1	0
Pruritis (%)	17	12.5	3.8	0
Sedation (%)	6.4‡	0	72.7	8.7

‡ = F/B<F/B/B on Day 1, $p<0.05$

The addition of butorphanol to continuous epidural F/B solutions did not result in a significant change in analgesia. The F/B/B group did have decreased pruritis; however, they exhibited more sedation than F/B patients. Therefore, while the addition of butorphanol to continuous epidural F/B solutions may decrease the incidence of pruritis, increases in sedation may limit its usefulness.

Reference: Ackerman & Junega, et al. Can J Anaesth 1989; 36:388-391.