Comparison of two bupivacaine solutions with clonidine for caudal anesthesia for former premature infants undergoing inguinal herniorrhaphy`

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Introduction: Former premature infants have a high incidence of inguinal hernias with a high risk of incarceration. They often have several medical complications (including respiratory dysfunction) that put them at a higher risk for postoperative respiratory complications such as apnea and need for controlled ventilation (1,2). Recently, the combination of bupivacaine and clonidine has been reported to provide successful caudal anesthesia in former premature infants (2,3). The purpose of the study was to compare the efficacy, safety, and complications of using caudal anesthesia in two different solutions (0.375% bupivacaine [1 ml/kg] with 1 μg/kg clonidine or 0.25% bupivacaine [1 ml/kg] with 1 μg/kg clonidine) for inguinal herniorrhaphy in former premature infants.

Methods: After institutional review board approval and informed consent, 26 former premature infants undergoing inguinal herniorrhaphy were randomized in a double-blinded method into either Group 375 (0.375% bupivacaine [1 ml/kg] with 1 μg/kg clonidine) or Group 25 (0.25% bupivacaine [1 ml/kg] with 1 μg/kg clonidine). After a peripheral intravenous line was started, patients received a caudal injection using sterile technique in the lateral decubitus position. No sedation or general anesthesia was used for placement or during surgery. If additional sedation or anesthesia was required, general anesthesia with an endotracheal tube was started. Onset time, surgical duration, and sensory level at beginning of surgery and after surgery, as well as every one-hour for 12 hours were recorded. At the end of surgery, the surgeons rated the anesthesia and the ability to teach surgical residents to perform the surgery (if the anesthesia could not have been better, the surgeon rated caudal anesthesia as "ideal"). In addition, the surgeon subjectively rated the amount of pushing. Postoperatively the infant was monitored in the Infant Special Care Unit for 12 apnea-free hours. Episodes of hypotension, bradycardia, desaturation below 95%, apneic episodes, and infant pain scores were noted hourly. Comparisons were made using unpaired Student's t-tests for continuous data and chi-square tests for frequency data.

Results: At the time this abstract was written, 26 patients had been studied, with 2 excluded because either no IV could be started (1 patient) or caudal space could not be found (1 patient). Of the remaining 24 patients in the study, 11 were placed in Group 25 and 13 were placed in Group 375. There was no significant difference between groups with respect to postconceptual birth age, birth weight, age at surgery, or weight at surgery. In both groups, all surgeries were completed under the study drugs and no general anesthesia was required. There were no episodes of hypotension or bradycardia in either group. The percentage of ideal anesthetic conditions was not significantly different between the two groups, and there were no significant differences in the other outcome measurements: height and duration of sensory block, adequacy of anesthesia as rated by the surgeon, and number of episodes of desaturations, apnea and pain scores greater >4 requiring additional medication (Table 1). Both groups had similar incidences of complications, but no patients required postoperative intubation or mechanical ventilation.

Drug	# of patients	# of GA	Weight at surgery (kg)	Duration of surgery (min)	Sensory block duration (hrs)	Ideal anesthesia conditions (#)*	Desaturation (#)	Apnea (#)
25	11	0	2.2 ± 0.2	68±17	3.0 ± 0.7	(9) 82%	(2) 18%	(2) 18%
375	13	0	2.7 ± 0.7	73±20	2.15 ± 1.0	(11) 100%	(1) 8%	(1) 8%
p** value			0.3	0.25	0.06	0.71	0.11	0.11
* Ideal anesthesia conditions and Pushing were ranked by the surgeon performing the operation. ** p value of <0.05 was considered significant.								

Discussion: We conclude that caudal anesthesia using a solution of 0.25% bupivicaine and 1 μg/cc clonidine at a dose of 1 ml/kg provides adequate anesthesia to former premature infants undergoing inguinal hernia. The higher concentration of 0.375% bupivacaine is unnecessary to achieve an adequate level and duration of anesthesia. Some apneic episodes should be expected with this technique and therefore infants must be monitored in an intensive care setting for 12 apnea-free hours.

References:

1. Somri M. et al., Anaesthesia, 1998
2. Jamali S. et al., Anesth Analg, 1994
3. Cucchiaro G. et al., Anesth Analg, 2001