Title: ROPIVACAINE VASOCONSTRICTS CUTANEOUS BLOOD VESSELS

Authors: D. J. Kopacz, M.D.; R.L. Carpenter, M.D.; D.C. Mackey, M.D.

Affiliation: Department of Anesthesiology, Virginia Mason Medical Center, Seattle, WA 98111

INTRODUCTION: Ropivacaine is a new aminoamide local anesthetic chemically similar to bupivacaine. Ropivacaine is believed to have an anesthetic duration similar to bupivacaine and etidocaine, but be less cardiotoxic. This study was designed to: 1) determine the effect of ropivacaine on cutaneous blood flow 2) compare the vascular effects of ropivacaine to bupivacaine, and 3) assess the ability of epinephrine to modify the vascular response when added to either of these drugs.

METHODS: After approval by the animal research committee, anesthesia was induced in six piglets (12.8-14.0 kg) with intraperitoneal thiamylal (25-40 mg/kg) and maintained with continuous intravenous methohexital. Baseline blood flow measurements were made with the laser doppler capillary perfusion monitor (Medpacific LD 5000) at control and experimental sites, each 7.5 cm apart. One cc of test solution was injected subcutaneously through a 30 gauge needle at each experimental site. Sites were randomized and observers were blinded to the solution injected. Sequential blood flow measurements were made at all sites at 5, 10, 15, 30, 60, and 90 minutes after injection.

Blood flow measurements were normalized to the control flow at each site, and changes in capillary flow produced by the drug were assessed by repeated-measures (two-way) ANOVA with $p < 0.05$ accepted as significant.

RESULTS: Ropivacaine (0.25 and 0.75%) decreased cutaneous capillary blood flow. In contrast, equal concentrations of bupivacaine increased cutaneous blood flow (Figure 1, p=.01). The addition of epinephrine (5 mcg/ml) to ropivacaine or bupivacaine caused a reduction in skin blood flow, overwhelming the vasodilatory effects of bupivacaine, and augmenting the vasoconstrictive effects of plain ropivacaine (Table 1).

CONCLUSION: Ropivacaine, although similar in chemical structure to bupivacaine, has markedly different effects on the cutaneous microvasculature. Ropivacaine is an effective vasoconstrictor, whereas bupivacaine is a potent vasodilator. The decrease in cutaneous blood flow with ropivacaine may offer several advantages over presently available local anesthetics, especially when the use of epinephrine is contraindicated.

Although no statistical difference (p = .99) in the reduction of blood flow could be demonstrated with the addition of epinephrine to ropivacaine, its addition may be warranted clinically to increase anesthetic duration and/or decrease systemic local anesthetic absorption in situations where epinephrine is not contraindicated.

Ropivacaine has unique properties (long duration of action with moderate vasoconstriction) that may make it ideally suited for infiltration anesthesia. Further study is necessary to determine whether the vascular responses we have demonstrated in cutaneous vessels are parallelled by epidural or spinal vessels, or the vasa nervosa of peripheral nerves. Furthermore, any centrally mediated effects of absorbed ropivacaine upon the peripheral vasculature is yet to be evaluated.

Figure 1: Change in Capillary Blood Flow (%) Produced by Ropivacaine and Bupivacaine versus Time

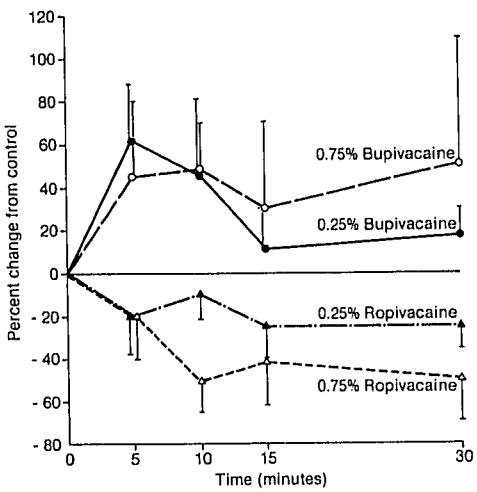

Table 1: Maximum % Change in Capillary Blood Flow (Mean ± SEM)

Solution	% Change
Ropivacaine 0.25%	-33.9 ± 18.4
Bupivacaine 0.25%	+61.9 ± 25.6
Ropivacaine 0.75%	-56.9 ± 20.0
Bupivacaine 0.75%	+52.3 ± 57.2
Ropivacaine 0.25% + Epi (5mcg/ml)	-43.6 ± 10.1
Bupivacaine 0.25% + Epi (5mcg/ml)	-62.9 ± 14.4
Ropivacaine 0.75% + Epi (5mcg/ml)	-43.0 ± 14.5
Bupivacaine 0.75% + Epi (5mcg/ml)	-68.8 ± 20.3