

TITLE: ESMOLOL FOR TREATMENT OF INTRAOPERATIVE TACHYCARDIA AND/OR HYPERTENSION - BOLUS LOADING TECHNIQUE

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INTRODUCTION: Esmolol (E) is a cardioselective ultra-short acting beta blocker. E has been used for prevention of hypertension and tachycardia during anesthesia. The purpose of our study was: 1) establish an optimal bolus dose that was effective for treating tachycardia and/or hypertension intraoperatively; 2) to investigate the effects of E on changes in hemodynamics in this setting.

METHODS: With institutional approval and written informed consent 15 CABG patients were premedicated with diazepam 0.15 mg/kg PO morphine 0.1 mg/kg IM and scopolamine 0.2 mg IM. After insertion of invasive monitoring catheters, the patients received midazolam .2 mg/kg IV, vecuronium .1 mg/kg, enflurane .5-1.5%, and 100% oxygen for anesthetic induction. After intubation, anesthesia was maintained with enflurane. Treatment criteria were a systolic blood pressure (SBP) ≥ 140 and/or a heart rate (HR) ≥ 80 . Graduated doses of E (listed in table), up to the effective dosage, were tested at least once. The bolus dosage was given over 15 seconds and a continuous infusion was started within two minutes. The dosage which consistently reduced the HR or SBP by 15% was declared "effective". The dosage was confirmed in three other patients. All statistical analyses were performed using SAS version 5.03. The results of statistical tests were analyzed using the p=0.05 level of significance.

RESULTS: Efficacy results are in the table. An 80 mg loading (0.9 mg/kg) dose resulted in four of five patients achieving HR and SBP efficacy end points. Heart rate, systolic blood pressure and cardiac index (CI) are illustrated in the figures. One patient, receiving 40 mg and an infusion of 6 mg/min (group 2) had persistent hypertension with systemic vascular resistance of 4,400 and low cardiac index (CI < 1).

DISCUSSION: Our study provides new information concerning dose and clinical hemodynamic responses to bolus dosing of E in lightly anesthetized patients undergoing CABG. E has a dose related effect on HR and SBP. There is not a good correlation between E dose and CI. One patient had a notable decrease in cardiac output with little effect on SBP or HR. This may reflect a direct negative inotropic effect.¹ Bolus loading with E to treat tachycardia is a simple alternative to prophylactic continuous infusions and may be appropriate during surgery when stimuli cause temporary increases in catecholamines. Use of E in patients with high systemic vascular resistance must be cautious. Treatment of perioperative tachycardia with E can safely be achieved with 80 mg. (approximately 1 mg/kg).

Study Group	Bolus Dose mg	Infusion Dose mg/min	Efficacy/#pt sample size
1	<40	6 or 12	0/4
2	40	6	2/4
3	40	12	3/4
4	80	12	4/5

Figure 1: Percent Change in HR

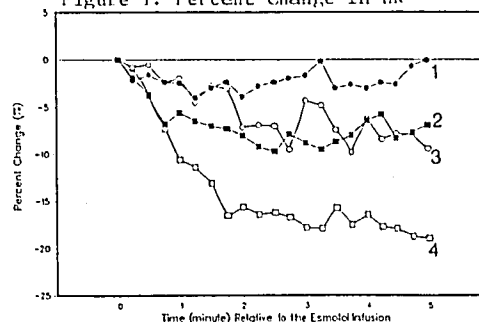
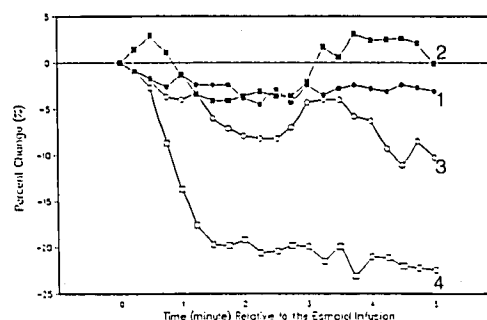
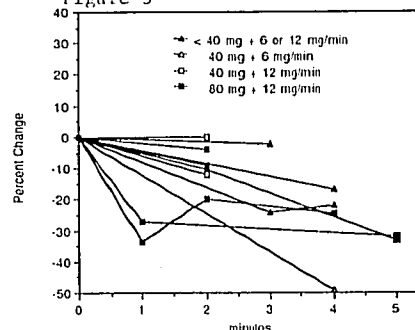


Figure 2: Percent Change in Systolic Blood Pressure



CHANGES IN CARDIAC INDEX FOLLOWING ESMOLOL
Figure 3



1. Jacobs JR, Maier GW, Rankin JS, Reves JG: Effect of esmolol on left ventricular function in the awake dog. Anesth Analg 66:S88, 1987.