DATE:

TITLE: RAPID HIGH DOSE FENTANYL INDUCTION FOR CABG

AUTHORS: Michael L. Kentor, M.D., Allen J. Schwalb, M.D., Richard W. Lieberman, M.D.

AFFILATION: Department of Anesthesia, University of Pennsylvania, Philadelphia, Pennsylvania 19104

INTRODUCTION:

High dose fentanyl-oxygen anesthesia has been shown to be an hemodynamically stable anesthetic, and is used frequently for patients undergoing open heart surgery.

In the methods described by Stanley[1] and Lunn[2], the rate of fentanyl infusion has been 200-300 ugm/minute. However, fentanyl is a potent respiratory depressant, and can produce truncal rigidity and decreased thoracic compliance. Clinically, during the induction of anesthesia with fentanyl-oxygen at the recommended rates we have frequently encounted patients with such severe chest wall rigidity, that neither spontaneous nor controlled ventilation could be achieved. Comstock et. al.[3], using an induction technique with fentanyl at a rate of 200 ugm/minute, also noted a high incidence of chest wall rigidity and hypercarbia, and conclused that the safe application of this technique will often necessitate neuromuscular blockade about the time of loss of consciousness (LOC) and in some circumstamces, prior to LOC. Others have avoided these problems of chest wall rigidity, hypercarbia, and paralyzing a still responsive patient by employing a rapid fentanyl infusion followed by immediate neuromuscular blockade. The purpose of this study was to evaluate the cardiovascular effects of a rapid fentanyl infusion in patients undergoing coronary artery bypass surgery.

METHODS:

The patient population included 5 patients scheduled for coronay artery bypass grafts who had a resting LVEDP$\leq$15 and a stable anginal pattern for two weeks prior to surgery. Patients with either left main coronary artery disease or BP greater than 160/90 were excluded. Premedication was with morphine and scopolamine, and monitoring included EKG, arterial line, and thermodilution pulmonary artery catheter placed prior to induction. The data collected included HR, CVP, PCWP, CO and calculated systemic and pulmonary vascular resistances (SVR & PVR). The data were collected prior to induction, during the period of preoxygenation, one minute after completion of the fentanyl infusion, one minute after tracheal anesthesia with lidocaine (LTA), and at one and five minutes after intubation.

All patients were given 500cc of crystalloid solution prior to induction. The patients were preoxygenated and then induced with 50 ugm/kg of fentanyl infused through the CVP over 60 seconds. The time to LOC was recorded, and the patients were then given 0.1 mg/kg of pancuronium, and were intubated after the trachea was topicalized with 4cc of 4% lidocaine.

RESULTS:

The duration from the start of fentanyl infusion until loss of consciousness averaged 78 seconds (range 60-110 sec). All patients demonstrated chest wall rigidity--a subjective determination made by the anesthesiologist--prior to the administration of pancuronium. This rigidity persisted an average of 60 sec. i.e., until pancuronium provided enough muscle relaxation for contolled ventilation. The period of rigidity was characterized by a rise of mean pCO_2 from a baseline of 34 torr to 45 torr.

The table summarizes the changes noted in major hemodynamic variables. At 60 sec after rapid infusion of high-dose fentanyl, the mean HR increased. This increase did not achieve statistical signigicance ($p<.05$), however, for an additional 3½ minutes i.e., until one minute after LTA. Statistically significant falls in MAP did not occur. Four out of 5 patients, on the other hand, had mild hypertension shortly after laryngoscopy, and were treated with 1-3 mg of trimethaphan. Cardiac output consistenly rose during the entire study period. This rise in CO was associated with significant decrease in SVR, and mild decreases in right-and left-sided filling pressures. This technigue was not associated with any significant increases in PVR; in fact, PVR tended to decrease following the onset of muscle relaxation.

CONCLUSION:

We conclude that high dose fentanyl can be given rapidly for induction of general anesthesia without fear of cardiac depression or wide swings in other hemodynamic parameters in this particular group of patients. The problem of chest wall rigidity seen during the slow infusion of fentanyl is not avoided by this rapid induction technique. However, due to the rapid loss of consciousness, there was never a need to paralyze a responsive patient.

	Control	LOC Pancur Admin	1 min post fentanyl	1 min# post LTA	1 min post intub	5 min post intub
Time (sec)	0	78	130	340	556	856
HR	57	55	66	79*	85+	78*
MAP	100	90	96	104	95	96
CVP	10.4		10.3	8.6	7.3+	7.9
PAP	20.6		21.6	21.9	20.5	19.3*
PCWP	15.2		15.1	16.0	13.5	12.8*
CO	4.38		5.22*	5.70	6.04	5.86
SVR	1718		1399*	1482	1302+	1315
PVR	99		107	80*	98	90

*p<.05, +p<.01, Students paired t-test when compared to control data

#4 out of 5 patients required 1-3 mg trimethaphan shortly after this point

BIBLIOGRAPHY:

1. Stanley, TH, et.al.: Anesthesia & Analgesia 57: 411, 1978

2. Lunn, JK et.al: Anesthesia & Analgesia 58: 390, 1979

3. Comstock, MK, et.al.: Abstracts, ASA Annual Meeting, 1979. pS 28.