

## Hemodynamic Effects of Remifentanyl in Children with Congenital Heart Disease

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**Introduction:** Infusion of remifentanyl (RE) has been observed to cause a significant decrease in heart rate (HR) in children with and without congenital heart disease (1,2). It is possible that the slowing of HR observed in children could be associated with an undesired decrease in cardiac output. *In vitro* studies also demonstrate a vasodilating effect of RE (3,4). The purpose of this pilot study was to examine the hemodynamic effects of remifentanyl infusion in children with congenital heart disease.

**Methods:** Ten children ranging in age from 3 months to 13 years were studied. All children had undergone open cardiac surgery for repair of congenital heart disease, had received fentanyl 30-50 mcg/kg for anesthesia, and had multi-lumen pulmonary artery catheters that were placed for postoperative monitoring purposes. Data collection took place in the operating room following termination of cardiopulmonary bypass and before sternal closure at a time when hemodynamic and volume status were stable. Five patients were receiving infusions of dopamine 5 mcg/kg/min and milrinone 0.5 mcg/kg/min. Cardiac output was measured by thermodilution, and hemodynamic parameters were calculated at baseline (pre-RE) and following 10 minutes (post-RE) of intravenous infusion of remifentanyl 0.5 mcg/kg/min.

**Results:** Cardiac index decreased significantly during RE infusion, but this was not associated with a significant decrease in HR. The decrease in CI was caused by a decrease in stroke volume index (statistically significant only in patients receiving dopamine + milrinone) and was accompanied by a decrease in MAP. In the absence of inotropic drugs, RE was associated with decreases in SVRI and PVRI. During inotropic infusion, SVRI remained unchanged and PVRI increased in response to RE. The decrease in CVP was consistent but not statistically significant.

	HR	SVI	CI	MAP	PAP	CVP	PAW	SVRI	PVRI
All patients:									
Pre-RE	123	33.8	3.93	77	27	19	15	1255	294
Post-RE	125	27.1	3.38*	56*	25	16	15	951	249
Patients WITHOUT dopamine + milrinone:									
Pre-RE	112	43.2	4.49	89	21	18	12	1344	173
Post-RE	121	29.4	3.56*	54*	20	14	15	948	119*
Patients WITH dopamine + milrinone:									
Pre-RE	132	33.2	4.3	74	30	20	18	913	196
Post-RE	138	26.8*	3.65*	63*	30	15	17	1099	260*
*P < 0.05									

**Discussion:** These preliminary data do not confirm the decrease in HR that has accompanied RE infusion in other studies (1,2) and suggest that vasodilatation of capacitance vessels (3) may reduce filling pressure and stroke volume. Dopamine may prevent a decrease in SVRI and PVRI during RE infusion. Further investigation of the hemodynamic effects of RE is indicated, as the small number of subjects reported here is subject to both type I and type II statistical errors.

### References:

- 1) Friesen et al. *Pediatr Anaesth* 2003;13:122
- 2) Chanavaz et al. *Anesthesiology* 2003;99:A1373
- 3) Duman et al. *J Cardiothorac Vasc Anesth* 2003;17:465
- 4) Unlugenc et al. *Acta Anesthesiol Scand* 2003;47:65