

Title: A COMPARISON OF ANESTHETIC TECHNIQUES FOR AORTIC RECONSTRUCTIVE SURGERY

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Introduction. The incidence of perioperative myocardial infarction associated with abdominal aortic surgery varies between 10 and 20%. Anesthetic agents alter the cardiac response to surgical stress, which may precipitate myocardial injury. Isoflurane is reported to produce peripheral vasodilation with minimal myocardial depression and is often used to control blood pressure during aortic surgery. We are reporting the results of a prospective, randomized trial of 22 patients undergoing infra-renal aortic reconstructive surgery comparing the effects of isoflurane with nitroprusside on ventricular function.

Methods. Each patient had a pulmonary arterial and a radial arterial catheter inserted to permit measurement of systolic and mean arterial pressure (SBP, MAP), pulmonary capillary wedge pressure (PCWP) and cardiac index (CI). Stroke work index (SWI) was calculated. Gated nuclear ventriculography provided a direct measure of ejection fraction (EF). End diastolic volume index (EDVI) and end systolic volume index (ESVI) were then calculated from the thermodilution stroke index and radionuclear ejection fraction. Anesthesia was induced with either 75 ug/kg fentanyl or 15 ug/kg sufentanil and 0.3 mg/kg metocurine. All patients were ventilated to normocarbida with 100% oxygen. Thirteen patients were randomized to receive isoflurane (FOR) following induction, and 9 patients received nitroprusside (NTP) to maintain MAP less than 100 mmHg. Measurements were made after induction with fentanyl or sufentanil (IND), before application of the aortic cross-clamp (PRE-XCL), before removal of the cross-clamp (XCL) and within 5 minutes of cross-clamp removal (POST-XCL).

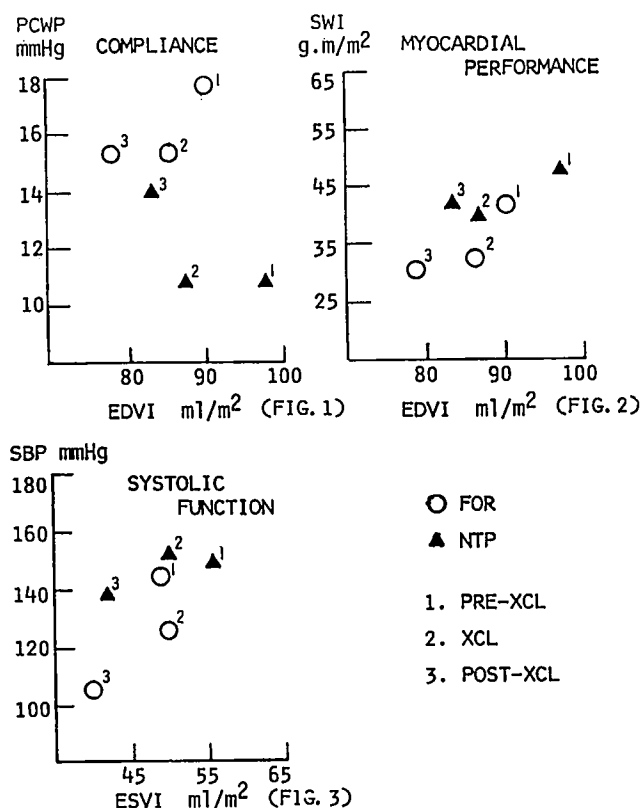
Results. The two groups had similar hemodynamics after induction except for the SBP which was higher ($p<0.05$) in the NTP group. Table 1 demonstrates the differences between the anesthetic techniques before and during aortic occlusion.

Table 1

| | PRE-XCL | | XCL | |
|--|-----------|-----------|-----------|------------|
| | FOR | NTP | FOR | NTP |
| CI L/min/m ² | 2.9±0.8 | 2.9±0.9 | 2.0±0.32 | 2.2±0.76 |
| PCWP mmHg | 18.1±5.2 | 11.8±3.4 | 15±4.2 | 11.7±2.4* |
| MAP mmHg | 94±10.6 | 91.7±20.7 | 80.6±10.7 | 94.0±14.9* |
| SBP mmHg | 141±22.6 | 143±33.9 | 121±15.4 | 147±29# |
| SWI g.m/m ² | 43.2±12.1 | 46.5±12.4 | 31.1±6.3 | 41.3±13.1 |
| EF % | 0.5±0.1 | 0.4±0.1 | 0.4±0.1 | 0.4±0.1 |
| EDVI ml/m ² | 90±43.8 | 98.2±51.1 | 85.8±45.1 | 87.5±41 |
| ESVI ml/m ² | 48±37.6 | 55.3±51.1 | 50.6±43.3 | 50.9±39.7 |
| Different than FOR by ANOVA: * $p<0.05$; # $p<0.01$ | | | | |

Isoflurane produced a significant rise in PCWP without a corresponding increase in EDVI both before and during the cross-clamp period. Both afterload (MAP) and myocardial work (SWI) were significantly lower during the cross-clamp period in this group. Following cross-clamp removal, SBP was lower in the FOR group ($p<0.05$) despite similar preloads (PCWP).

Myocardial performance (the relation between SWI and EDVI), diastolic compliance (the relation between PCWP and EDVI) and systolic function (the relation between SBP and ESVI) were evaluated before, during and after aortic clamping, and the results are presented in Figures 1-3.



Both myocardial performance and systolic function were lower in the FOR group despite similar preload (EDVI). Diastolic compliance remained lower in the FOR group, suggesting myocardial ischemia.

Conclusion. Isoflurane was found to depress ventricular function, and decrease diastolic compliance during abdominal aortic surgery. The agent should be used cautiously in patients with evidence of myocardial ischemia.