

PH-GUIDED MYOCARDIAL MANAGEMENT IN 1091 PATIENTS: A TWENTY-FIVE YEAR EXPERIENCE WITH REDUCING MYOCARDIAL ISCHEMIA DURING CARDIAC SURGERY

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Background: Myocardial pH (MpH) measurement has been shown to be a reliable indicator of ischemia during cardiac surgery. We have identified threshold pH levels (corrected to 37°C, pH37C) that adversely affect short-term (pH37C < 6.35 during aortic clamping) and long-term patient outcomes (pH37C < 6.73 at reperfusion). We reviewed our twenty-five year experience with MpH in order to determine the efficacy of pH-guided myocardial management techniques (pHMT) in preventing or limiting myocardial ischemic acidosis (MIA).

Methods: Prospectively collected data from 1,091 patients were analyzed. All patients had MpH monitored. Group I (1982-90) patients had MpH monitoring only. Group II (1991-8/1997) patients underwent interventional trials to identify pHMT effective in reducing MIA. Promising pHMT were applied in Group III (9/1997-2006).

Results: Intergroup comparisons of relevant pre-, intra- and postoperative variables are shown (Table). The percentages of patients in each group with MpH below threshold levels are shown (Figure).

Figure 1.

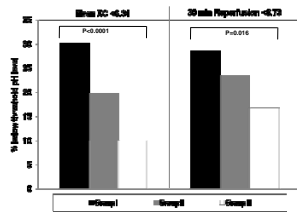


Table 1: Relevant pre-, intra-, and postoperative variables

Variable	Group I (n = 237)	Group II (n = 293)	Group III (n = 561)	p-value
Patient age (years)	60.2 ± 8.2	65.4 ± 9.5	67.6 ± 9.6	<0.0001
Total bypass time (min)	162.4 ± 61.2	159.1 ± 61.1	131.8 ± 59.5	<0.0001
Aortic clamping time (min)	82.5 ± 41.8	84.5 ± 38.2	82.0 ± 40.6	0.47
pH _{37c} prior to AC	6.63 ± 0.26	6.61 ± 0.30	6.77 ± 0.24	<0.0001
Mean pH _{37c} during AC	6.51 ± 0.31	6.53 ± 0.30	6.61 ± 0.22	<0.0001
pH _{37c} at 15 min of reperfusion	6.66 ± 0.34	6.83 ± 0.34	6.91 ± 0.26	<0.0001
pH _{37c} at 30 min of reperfusion	6.87 ± 0.34	6.94 ± 0.36	6.97 ± 0.25	0.04
pH at _{37c} end of reperfusion	6.98 ± 0.35	7.00 ± 0.32	6.96 ± 0.24	0.002
Operative death (n/%)	4/ 7.7	11 / 4.3	11 / 2.3	0.06

Conclusions: Without intervention, regional MIA is encountered in a significant proportion of patients undergoing cardiac surgery. pHMT were effective in reducing the magnitude of MIA encountered during cardiac surgery. pH-guided myocardial management techniques allow for the application of patient-specific intraoperative interventions that reduce the magnitude of MIA and thereby improve short- and long-term outcomes.