

Title : MYOCARDIAL TEMPERATURE MONITORING DURING AORTIC CROSS-CLAMPING

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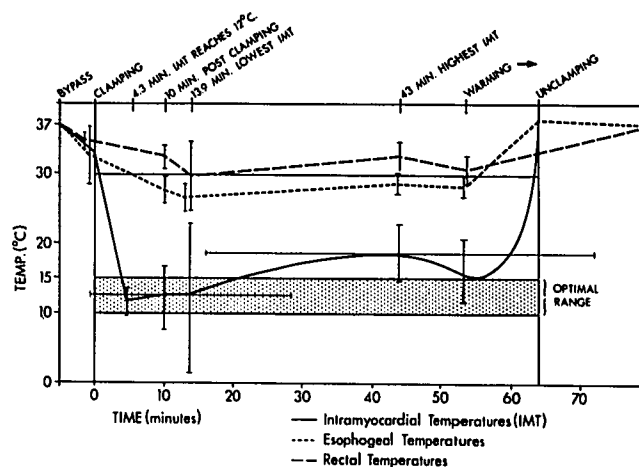
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Although there is some debate, the most widely accepted optimal temperature for myocardial preservation during aortic cross-clamping is 10-15° C. Myocardial hypothermia is usually achieved by combining coronary artery perfusion with 4° C cardioplegic solution and a 4° C saline bath irrigation within the pericardial sac. In our hospital, surgeons have no single protocol for myocardial preservation. The amount of coronary perfusate used and the amount of saline irrigant varies from surgeon to surgeon, and even from patient to patient with any one surgeon, depending upon his conviction at the time. This study was designed to monitor the effectiveness of these various techniques in lowering and maintaining myocardial temperatures within the optimal range.

Method We monitored intramyocardial temperature (IMT) during aortic cross-clamping and cardiopulmonary bypass in 72 consecutive patients undergoing coronary artery bypass grafting. A 24-gauge needle thermistor was placed by the surgeon deep in the lateral wall of the left ventricle prior to aortic cross-clamping. IMT was monitored continuously on a Tele-Thermometer and recorded every minute. We also monitored and recorded the esophageal and rectal temperatures, and the volumes of coronary perfusate and saline irrigant used. The surgeon dictated the volume and time of administration of both perfusate and irrigant to be used. We plotted the three temperatures in relation to time and cooling maneuvers.

Results There was marked variability in volumes of cold solution asked for by the surgeons. Irrigant bath solution averaged 4.9 liters (± 3.3). The perfusate volume ranged between 340-1600 milliliters. In 52 patients where the IMT reached 12° C early, 6.8 ml/kg (± 5.3) was required. In 18 patients where the IMT fell only to 14-25° C, 8.9 ml/kg (± 4.1) of coronary perfusate had been given. We found poor correlation between the volume of cold solution used and IMT.

Although IMT decreased as cold solutions were given, the rate of decrease was unpredictable. Ten minutes after aortic cross-clamping, the mean IMT was 12.3° C (± 4.6). The lowest IMT (12.3° C ± 10.4) was reached 13.9 minutes (± 14.7) after cross-clamping. Also unpredictable was the rate of spontaneous myocardial rewarming. The highest IMT (18.6° C ± 3.9) occurred 43 minutes (± 28) after cross-clamping. In 27 patients (37%), the IMT rose to 20° C and as high as 28° C.



Discussion This was designed as a blind study with the surgical team unaware of the IMT. But once it became apparent that cooling techniques were unpredictable in maintaining an optimal IMT, the surgeons frequently asked for the IMT and adjusted their techniques accordingly. Thus, our results are skewed towards lower IMT's. Despite this, the IMT rose to non-protective levels in 37% of patients.

Cooling techniques used hitherto in our hospital, similar to those used elsewhere, do not predictably maintain optimal myocardial hypothermia. Monitoring of IMT during aortic cross-clamping is not only beneficial but necessary if preservation of myocardial function is to be assured.

References

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