Title: TEMPERATURE GRADIENTS IN CARDIAC SURGICAL PATIENTS: A COMPARISON OF HALOTHANE AND FENTANYL

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Patients subjected to hypothermic cardiopulmonary bypass (CPB) develop wide temperature gradients during cooling and rewarming. Several studies in non-cardiac operations have suggested that the anesthetic utilized may be a significant factor not only in heat loss but the degree of temperature gradients developed. High dose narcotic anesthesia appears to affect temperature regulation by direct activity on the thermo regulatory centers of the hypothalamus rather than simple production of poikilothermia. Inhalation anesthetics, however, affect the temperature regulating center in the hypothalamus by interfering with the feedback system from the periphery. Because of this difference in mechanisms we undertook to determine the effect of high dose narcotic anesthesia (fentanyl) on temperature gradients in patients subjected to hypothermic CPB and to compare this with inhalation anesthesia (halothane)

Methods. Twenty-two patients scheduled for elective coronary artery grafting were studied in two equal groups. Group 1 received fentanyl 100 µg/kg ar[illegible] Group 2 - halothane 0.5-1.5%. Informed consent was obtained in all cases and the protocol was approved by the Human Studies Committee of the institution. Patients were comparable for age, sex, type of operation and degree of disease. Immediately following induction, thermistor probes were placed in the rectum and esophagus and skin temperature electrodes were placed on the ring finger and upper arm. A calibrated needle thermistor probe was placed in the deltoid muscle of the same extremity and temperatures were recorded until one hour post bypass.

Results. The interval prior to institution of CPB and the time on CPB was comparable for both groups. The time required to cool to the lowest esophageal temperature was also comparable (Group 1 - 23.6±3.3°C - 14± 5 min; Group 2 - 24±3.7°C - 13±4 min) as was rewarming time (Group 1 - 23±8 min; Group 2- 21±9 min. Figures 1 and 2 demonstrate the parallel temperature changes which occurred in both groups of patients in the areas measured.

FIGURE 1

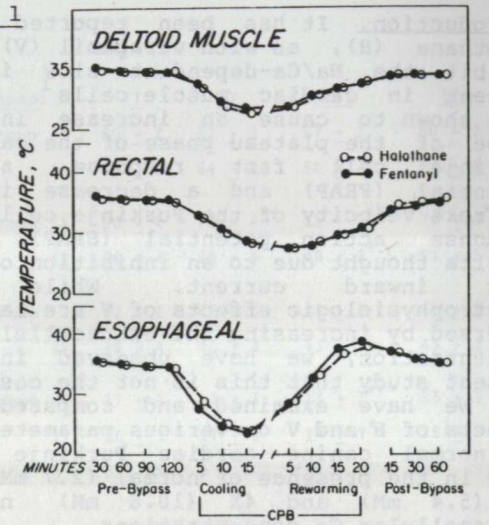
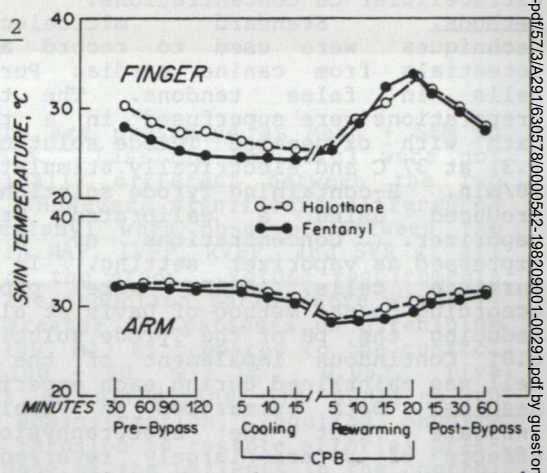


FIGURE 2



Discussion. These data demonstrate a remarkable similarity in the pattern of temperature change and gradients in the two groups of patients, despite the different effects of the two anesthetics on central temperature regulation. In the post bypass period, both groups demonstrated an inverse relationship between esophageal and rectal temperature which required approximately 60 min for equillibration. Wide variations in skin temperature also occurred but there was no difference between groups. The same is true for deltoid muscle temperature. These data suggest then that regardless of the effect of either anesthetic on hormonal responses, the distribution of the cardiac output, or central effect, the net effect on body temperature and gradients is the same.

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