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Avoiding Hypothermia during Off-Pump Coronary Artery Bypass Grafting: A Comparison of Three Different Warming Systems

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Patients undergoing off-pump coronary artery bypass grafting (OPCAB) are prone to severe perioperative hypothermia. Subsequent coagulopathy may result in increased blood loss and need for transfusion^{1;2}. The aim of this prospective randomized trial was to evaluate the efficacy of three different intraoperative warming systems (Warm-touch" [W], Thermamed Medeqco" [T], Allon" 2001 [A]) on maintenance of normothermia and to investigate their effect on perioperative bleeding and transfusion requirements.

Methods: *With institutional approval and patient informed consent 90 patients presenting for elective multiple OPCAB were randomly assigned to one of the three warming systems. Platelet glycoproteine inhibitor therapy, pre-existing coagulation disorders and a hematocrit (HCT \leq 30 %) were exclusion criteria. **Active warming** was started after induction of anesthesia (W and T set to 42° C, A set to 36.7°C body core temperature [BCT]). Intraoperative standard heparin therapy was reversed at the end of the operation with protamine according to institutional standards.*

Perioperative autologous red blood cell (RBC) transfusion was based on ASA guidelines³. BCT was recorded every 30 min during surgery and the re-warming period on the ICU. Maximal intraoperative BCT decrease/increase was calculated and the duration of re-warming (to reach 36.7° C) was noted. Intraoperative blood loss, auto-transfusion, and RBC transfusion were recorded. ANOVA with post-hoc Schéffe test was performed. A p value < 0.05 was considered statistically significant.

Results: *30 patients in each group (W, T, A), ASA III, age 65±11 years (mean±SD), body mass index 29±3, were studied. Duration of operation was comparable between groups (W: 232±65 min, T: 248±46 min, A: 249±68 min, p = 0.4-0.8). Course of BCT during surgery and at the end was significantly different between W, T and A (table), as was postoperative re-warming (W: 288±96 min, T: 214±104 min, A: 82±101 min; p<0.05 for all comparisons). Intraoperative blood loss, autotransfusion and the total amount of transfusion was significantly lower for A compared to T and W. RBC transfusion was not significantly different between the groups (table).*

Conclusion: *Normothermia during OPCAB was maintained by the Allon"system only. With this concept, the postoperative re-warming period can be significantly shortened and both over-all blood loss and transfusion requirements can be reduced. In this investigation, however, RBC transfusion volumes were not influenced significantly.*

References:

1. *Lancet* 1996; 347:289-92
2. *J Thorac Cardiovasc Surg* 1992; 104: 108-16
3. *Anesthesiology* 1996; 84: 732-47.

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Body core temperature and blood loss / transfusions

Warming systems		W	T	A
BCT Baseline	°c	36.3±0.3	36.1±0.3	36.2±0.3
BCT End	°c	34.7±0.9	35.6±0.8*	36.5±0.4§+
Maximal BCT decrease	°c	-1.7±0.7	-1.1±0.5*	-0.6±0.4§+
Maximal BCT increase	°c	+0.2±0.2	+0.4±0.3*	+1.0±0.5§+
HCT Baseline	%	40.6±5.6	40.4±5.8	38.6±5.0
HCT End	%	28.6±4.7	28.2±3.7	28.3±3.9
Intraoperative blood loss	ml	1392±687	1345±634	928±436§+
Autotransfusion	ml	588±348	456±210	277±190§+
RBC transfusion	ml	200±328	275±406	104±224
Total transfusion	ml	788±585	713±491	381±315§+

Data are mean±SD; * $p < 0.05$ (W vs. T), § $p < 0.05$ (W vs. A), + $p < 0.05$ (T vs. A)

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