

Effects of continuous infusion with HSD versus HSH ON Fluid Extravasation in piglets During CPB.

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INTRODUCTION:

Crystalloids are commonly used as priming solution and as supplemental fluid during cardiopulmonary bypass (CPB). Crystalloid hemodilution results in a drop in the plasma colloid osmotic pressure (COP_p), and may lead to interstitial fluid accumulation with edema formation in the different tissues and organs.

Objective:

The objective of this study was to examine the effects on fluid extravasation of two types of combined solutions, HyperSalineDextran (HSD)₁ or HyperSalineHydroxyethylstarch (HSH)₂ during normothermic (38°C) and hypothermic (28 °C) CPB in piglets.

Material and methods

20 anesthetized young pigs, were allocated to 3 different groups: the HSD-group (n=7), the HSH-group (n=6) or the controlgroup (C-group, n=7). Acetated Ringer's solution was used as prime (1115 ml) and supplemental fluid in all animals.

The HSH- and the HSD-group received a continuous infusion of 1 ml/kg/min of HSH or HSD respectively throughout the study in addition to 4 ml/kg/min of acetated Ringer's solution.

The C-group had an infusion of 5 ml/kg/min of acetated Ringer's solution. After 1 h of normothermic CPB, hypothermic CPB was initiated and continued for 90 min. Fluid balance, electrolytes, COP_p, and acid-base parameters were recorded. Plasma volume (Pv) and fluid extravasation rate (FER) were calculated.

FER = Net fluid balance - .Pv

HSD-group₁ HSH-group₂ C-group

Pre-

CPB 38 °C 28 °C Pre-

CPB 38 °C 28 °C Pre-

CPB 38 °C 28 °C

FER

mL/kg/

min

0,16

(0,03)

0,67*

(0,15)

0,10*

(0,05)

0,19

(0,09)

0,49*

(0,07)

0,35*

(0,10)

0,21

(0,07)

1,00

(0,27)

0,57

(0,14)

Statistics: Repeated measurements ANOVA with post-test.(SPSSver13) Results as mean (SD)

*: $p < 0,05$ compared to C -group, $\therefore p < 0,05$ compared to HSH,

1): HyperSalineDextran (HSD) = RescueFlow®: 7,5% NaCl / 6% dextran70

2): HyperSalineHydroxyethylstarch (HSH) = HyperHaes®: 7,2% NaCl/poly(O-2-hydroxyethyl) starch 6%

Results: HSD and HSH contributed to lower FER during normothermic and hypothermic CPB compared with the C-group. During hypothermic CPB, FER was less in the HSD- than the HSH-group. Ph was slightly reduced in all groups but remained within normal range. Serum sodium increased to 147,7 (1,6) and 149,6 (1,3) in the HSH and HSD respectively while it was 141,3 (3,8) in the control group ($P < 0,05$). The C-group had a significant lower COPp than the other groups at the end of the experiment.

Conclusion: Infusion of HSD and HSH during CPB reduces fluid extravasation. HSD may be more effective than HSH during hypothermic CPB. The accompanying biochemical derangements are moderate and with no obvious adverse effects.