Influence of saline based hydroxylethyl starch on umbilical cord blood electrolytes

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BackGround

Hydroxyethyl starch (HES) is widely used to prevent and treatment for spinal induced hypotension in cesarean section. On the other hand, use of saline-based HES might lead to be hyperchloremia. However, influence of saline-based HES on umbilical cord blood electrolyte remain unclear. Therefore, we conducted retrospective analysis.

Method

Study Design: Retrospective study

Subjective: Consecutive single-pregnancy patients who underwent cesarean section with combined spinal-epidural anesthesia, at no sooner than 37 weeks of gestation (2014/1-2016/3)

Dividing: group A; Received saline-based 6% HES 130/0.4 group B; HES not administered

Data collection: Age, BMI, Gestational week, Time to delivery from operating room admission, Infusion volume, Blood loss, Urine volume, Apgar score at 1 and 5 min, Umbilical cord blood (Cl⁻,Na⁺,K⁺,pH,base excess)

Definition: The difference of 2.5 mmol/l or more as clinically significant considering 15% of the normal range

Analysis: The Mann–Whitney U test. P values less than 0.05 were considered statistically significant.

Results

- ✓ We analyzed data of 93 patients; (Group A: 43 patients, B: 50 patients)
- ✓ Background were not significantly different between two groups (Table 1).
- ✓ Infusion volume until delivery were similar.
- ✓ 461 ± 167 ml of saline-based HES was administered in group A (Table 2).
- ✓ The umbilical cord **chloride** level at delivery was significantly higher in group A.(Table 2).
- ✓ No differences were observed in the Apgar score and other umbilical cord laboratory data at delivery (Na⁺, K⁺, pH, BE)(Table.2).

Discussion

- ✓ Previous studies showed use of saline-based HES influenced pH and Cl⁻ (2-3 mmol/l in Cl⁻ level and 0.03 in pH) in major surgery^{1,2}.
- ✓ Our study indicated that absolute difference value in chloride level was only 1 mmol/l .
- ✓ In terms of the risk-benefit balance, anesthesiologists may consider **500 ml** of saline-based HES as the upper limit for routine use .

Conclusion

We suggest that although the use of up to 500 ml of saline-based HES during cesarean section influences umbilical cord blood electrolytes, the effect is not of a clinically significant magnitude.

		Group A (N = 43)	Group B (N = 50)	P value
Age	(years)	34 ± 5	32 ± 6	0.07
Height	(cm)	157 ± 5	156 ± 5	0.64
Weight	(kg)	59 ± 9	61 ± 10	0.50
Body mass index	(kg/m	24 ± 4	25 ± 4	0.44
Gestational week	(week)	38 ± 1	38 ± 1	0.08
Duration of operation	(min)	75 ± 19	78 ± 19	0.45
Duration of anesthesia	(min)	99 ± 22	102 ± 21	0.51
Time to delivery	(ml)	57 ± 14	56 ± 14	0.74
Total infusion	(ml)	2247 ± 523	2101 ± 578	0.21
Blood loss	(ml)	966 ± 443	987 ± 460	0.82
Urine volume	(ml)	335 ± 209	383 ± 299	0.38

(Table.1) Patient backgrounds

		Group A (N = 43)	Group B (N = 50)	P value
Infusion until delivery	(ml)	1316 ± 384	1176 ± 444	0.11
Saline-based HES 130/0.4	(ml)	461 ± 167	0	-
Bicarbonate Ringer’s solution	(ml)	470 ± 410	541 ± 410	0.41
Acetate Ringer’s solution	(ml)	294 ± 332	541 ± 389	0.002
Saline	(ml)	91 ± 29	94 ± 24	0.55
Apgar score 1 min		7.9 ± 0.7	7.9 ± 1.0	0.94
Apgar score 5 min		8.8 ± 0.5	8.6 ± 0.9	0.21
Umbilical cord data on delivery				
pH		7.32 ± 0.04	7.30 ± 0.05	0.12
Base excess (mmol/l)		-2.8 ± 1.6	-2.8 ± 1.6	0.94
Na ⁺ (mmol/l)		136 ± 2	136 ± 1	0.69
K ⁺ (mmol/l)		3.9 ± 0.4	4.0 ± 0.3	0.69
Cl ⁻ (mmol/l)		108 ± 2	107 ± 2	0.02

(Table. 2) Infusion and laboratory data

(1) J Cardiothorac Vasc Anesth. 2011;25:407-14 (2) J Clin Anesth. 2016;32:267-73