EFFECTS OF HYDROXYETHYL STARCH SOLUTION (HES70/0.55/4) ON COAGULATION

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Purpose: Hydroxyethyl starch solution (HES70/0.55/4: Hespander; Fresenius Kabi Japan; average molecular weight: 70000, degree of substitution: 0.55, C2/C6 ratio: 4) used in Japan is expected to have less adverse effects on coagulation compared to other HES products because of the molecular structures. We performed this study to explore the effects of high-dose HES70/0.55/4 on coagulation in patients undergoing major surgeries while minimizing or eliminating other potential factors influencing coagulation such as large blood loss and administration of fresh frozen plasma (FFP).

Methods: We reviewed all anesthetic records from February 1 to July 31, 2011. A total of 43 patients received more than 2000 ml of HES during the surgeries and had complete sets of international normalized ratio of prothrombin time (PT-INR) and institutionally-normalized ratio of activated partial thromboplastin time (APTT-R) before and immediately after HES administration. We excluded 14 patients who underwent hepatectomy and had taken preoperative anticoagulation or anti-platelet medication. We selected 16 patients who lost their blood less than 20 ml/kg by the measurements of coagulation times. The coagulation data of post 2000 ml administration of HES solution were compared to baseline preoperative data.

Results: Both PT-INR and APTT-R significantly increased after HES administration ($P < 0.01$) (Figure 1). Although one patient had 2.1 APTT-R which exceeded a criterion for FFP administration, post-HES PT-INR and APTT-R values were below the criteria in the remaining 15 patients. Interestingly, post HES APTT-R values were always greater than post HES PT-INR values, suggesting more impairment of intrinsic than extrinsic coagulation pathway.

Conclusion: No deteriorative effects of high-dose HES70/0.55/4 administration on coagulation were observed. However, it is advised to measure both PT-INR and APTT in patients with high dose HES70/0.55/4 administration.

Table 1 Characteristics of Patients and Bleeding

	Age (years)	Height (cm)	Body Weight (kg)	Bleeding (ml/kg)
Mean	55.3	161.3	57.8	11.8
SD	13.7	8.7	11.4	4.0
Max	29	148	47	6.0
Min	75	177	82	19.1

Figure 1 Coagulation data of preoperative baseline and post HES administration