Changes of circulating blood volume in coronary arterial graft surgery with and without cardiopulmonary bypass

To the Editor:

We evaluated the circulating blood volume (BV) of patients who underwent cardiac surgery with or without cardiopulmonary bypass (CPB) by using the new pulse dye-densitometry (PDD) method,¹⁻³ to measure whether there are differences in circulating BV changes during and after surgery.

After approval by our Institutional Ethics Committee and informed consent, anesthesia for patients with (*n*=12) and without (*n*=12) CPB was induced by midazolam, fentanyl, and vecuronium. Anesthesia was then maintained with midazolam and fentanyl, and/or sevoflurane. Before (preoperative) and after surgery (postoperative), including arrival in the intensive care unit, at 9:00 a.m. (POD 1) the morning after surgery, and two days afterwards at 9:00 a.m. (POD 2), BV was measured by the usual PDD methods using a DDG analyzer (Nihon Kohden Co., Tokyo, Japan). No significant differences between the CPB vs the non-CPB group were observed in age, weight, height, duration of operation and anesthesia. The changes of BV and fluid balance values are shown at the four different times measured, in the accompanying Table. BV in the CPB group decreased postoperatively and during POD 1, whereas BV in the non-CPB group did not change. A significant difference in BV was observed between the CPB and non-CPB groups at POD 1.

Our results suggest that the BV of patients undergoing coronary arterial graft surgery with CPB decreases after surgery and gradually recovers to its preoperative

level, whereas the BV in patients undergoing surgery without CPB does not change postoperatively.

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Identification of the thoracic epidural space by the running infusion drip technique

To the Editor:

Location of the thoracic epidural space between T3 and T7 is difficult because of the extreme caudad angulation of the long posterior spinous processes at these levels. Also, above L2, the epidural space gradually becomes smaller because of the size of the spinal cord.

The loss-of-resistance technique is the most frequently used method for locating the epidural space. However, because of the difficulty of identification of

TABLE Changes of BV and in-out balance values

	<i>Preoperative</i>	<i>Postoperative</i>	<i>POD 1</i>	<i>POD 2</i>
<i>BV (L)</i>				
CPB	5.11 ± 1.64	3.73 ± 1.02a	3.81 ± 0.49a	4.73 ± 1.13
non-CPB	5.29 ± 0.97	4.23 ± 1.16	5.21 ± 1.21*	5.44 ± 1.24
	<i>Prepost</i>	<i>Post-POD 1</i>	<i>POD1-POD 2</i>	
<i>Fluid balance (mL)</i>				
CPB	4890 ± 1572	478 ± 526	290 ± 694	
non-CPB	3188 ± 773*	-59 ± 754	-789 ± 607*	

BV=circulating blood volume, fluid balance=fluid transfusion volume-blood loss-urine output; Prepost=fluid balance during anesthesia; Post-POD 1=fluid balance from postoperative to POD 1; POD 1-POD 2=in-out balance from POD 1 to POD 2; CPB=cardiopulmonary bypass.

a: different from preoperative (ANOVA, *P* <0.05).

*Different from CPB group (non-paired t test, *P* <0.05).

Results are mean ± SD.