Preoperative Predictors of Postoperative Cognitive Dysfunction
after Y-graft Replacement for Abdominal Aortic Aneurysm

M Hayashi, MD, T Baba, MD. K Maekawa, MD, Y Tokunaga, MD, and N Miyagawa, MD
Department of Anesthesiology, Kumamoto Chuo Hospital, Kumamoto, Japan

Background

Postoperative cognitive dysfunction (POCD) is believed to result from the stress associated with operations. Although Y-graft replacement is a highly invasive procedure and should lead to an elevated rate of subsequent POCD, there are only a few reports of preoperative predictors of POCD after Y-graft replacement.

Objective

To identify the preoperative predictors of POCD after Y-graft replacement.

Materials & Methods

Study population: elective 65 patients (72.3±7.0 ys) underwent Y-graft replacement for Abdominal aortic aneurysm (Jul.2010 - Apr.2015)

Anaesthesia:

- Either general anesthesia or combined general and epidural anesthesia

Neurological evaluation: preop and 7 days postop

Hasegawa Dementia Scale	: HDS, modification of MMSE, full score 30
Kana pick-up test	: letter cancellation test, full score 60
Digit Symbol test	
Digit Span test	

- POCD was defined as a decrease of at least 20% from baseline for an individual's performance in more than one test.

Statistical analysis:

- Unpaired t-test, and chi-square test or Fisher's exact test
P<0.05 was considered statistically significant.
- Stepwise logistic regression analysis
The level of significance for the univariate screening regressions was set at P<0.2
The ROC curves were depicted and the cut-offs were determined by the shortest distance from the top left corner of the curve.
- Comparison of POCD group and non POCD group characteristics and perioperative factors.
- Evaluate the probability of POCD for each combination of risk factors.

Result

- The incidence of POCD was 36.9% (24/65)

Univariate analysis			
Table 1. Comparison of patients with and without POCD ^a			
	POCD (n=24)	Non-POCD (n=41)	P value ^b
Preoperative factor			
Age (year)	75.2±7.1	70.6±6.7	<.01
Sex (male/female)	17/7	33/8	0.37
ASA-PS	2.5±0.5	2.4±0.5	0.40
Hypertension	20 (83)	40 (98)	0.06
Diabetes mellitus	2 (8)	9 (22)	0.25
Hyperlipidemia	13 (54)	21 (51)	0.82
Smoking	14 (58)	27 (66)	0.54
Serum creatinine (mg/dL)	1.1±0.5	1.7±2.1	0.21
Cerebrovascular disease	8 (33)	5 (12)	0.06
Ischemic heart disease	11 (46)	16 (39)	0.59
Peripheral vascular disease	2 (8)	2 (5)	0.62
Maximum diameter of aneurysm (mm)	52±9	55±9	0.30
Ejection fraction (%)	69±8	69±8	0.91
Years of education (year)	10±3	12±2	0.06
Medication	Inotrope	39 (95)	0.62
	Minor tranquilizer	8 (20)	0.21
	Statin	22 (54)	0.99
Intraoperative factor			
Duration of surgery (min)	351±134	338±111	0.66
Minimum Hb (g/dL)	8.4±1.1	8.8±1.3	0.13
Blood transfusion	11 (46)	14 (34)	0.35
Postoperative factor			
Analgesic agent	21 (88)	30 (73)	0.22
Opioid analgesic	19 (79)	33 (81)	>.99
Mortality	1 (2)	0 (0)	>.99

^aData expressed as number (%) or mean ± standard deviation.
^bP values refer to comparisons between groups.

Figure1. Preoperative cognitive tests

Table2. Cut-offs values for POCD risk

	Cut-offs value	sensitivity	specificity	AUC
Age (year)	74	0.667	0.737	0.702
Minimum Hb (g/dL)	8.6	0.583	0.526	0.555
Schooling history (year)	9	0.583	0.711	0.634
HDS	28	0.833	0.632	0.796
Kana pick-up test	26	0.708	0.500	0.655
Digit Symbol test	34	0.708	0.737	0.751

AUC: area under the curve, HDS: Hasegawa Dementia Scale

Table 3. Multivariate analysis

	OR	95% CI	P value
CVD	3.04	0.66-14.09	0.15
Age ≥74 ys	4.47	1.30-15.31	0.02
HDS ≤28	7.76	2.05-29.33	<.01

CVD: Cerebrovascular disease OR: odds ratio
HDS: Hasegawa Dementia Scale CI: confidence interval

CVD, age≥74 ys, HDS ≤28 were preoperative predictors of POCD.

Figure2. The probability of POCD for each combination of risk factors

CVD: Cerebrovascular disease, Age: Age ≥74 ys, HDS: Hasegawa Dementia Scale score ≤28

•The probability of POCD in AAA patients who underwent Y-graft replacement with CVD, Age ≥74 ys, and HDS score ≤28 was 0.97

Conclusion

- The incidence of POCD after Y-graft replacement was 36.9% (24 / 65).
- Cerebrovascular disease, age ≥74 ys, HDS score ≤28 were independent preoperative predictors of POCD. These factors represent decreased cognitive reserve, and would be associated with POCD.
- HDS or MMSE may be useful to predict POCD before surgery in elderly patient with history of CVD.