CONTROVERSES ET ACTUALITÉS EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES IN VASCULAR SURGERY

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Can preoperative myocardial perfusion SPECT test predict late CV death after AAA repair?

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Disclosure

Speaker name:

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- ☐ I have the following potential conflicts of interest to report:
- ☐ Consulting
- ☐ Employment in industry
- ☐ Shareholder in a healthcare company
- ☐ Owner of a healthcare company
- ☐ Other(s)
- ■ I do not have any potential conflict of interest

Background

Stress myocardial perfusion single-photon emission computed tomography (SPECT) is an established tool not only to diagnose coronary artery disease (CAD) but also to predict outcome.

In particular, the summed stress score (SSS), representing the extent of myocardial perfusion abnormality, can well predict future morbidity and mortality.

Although many studies have shown that CAD is a risk factor after elective AAA repair, the definitions of CAD have differed between studies. Furthermore, limited reports on stress myocardial perfusion SPECT findings are available concerning prediction of long-term cardiovascular mortality after elective AAA.

Purpose

- The purpose of this study was to determine risk factors, including the summed stress score (SSS) evaluated on preoperative pharmacologic stress myocardial perfusion SPECT, for cardiovascular death in Japanese patients undergoing elective AAA repair.

Patients

- This study followed consecutive patients who underwent elective infrarenal AAA repair (N=286), by open aneurysmal repair (OAR N=146) or EVAR,(N=140) between January 2007 and June 2011 in Nagoya University Hospital.
- In all patients, except for those with uncontrolled bronchial asthma, pharmacologic stress myocardial perfusion SPECT was performed within 2 months before AAA repair.
- The primary endpoint was cardiac death, defined as death from cardiovascular cause or sudden death. Patients were followed up to 3 years.

Pharmacologic Stress Myocardial Perfusion SPECT

- For the stress, adenosine triphosphate disodium was used for all patients, a dose of 720 µg/kg being injected over 6 min using an infusion pump.
- Thallium-201 was injected i.v. 3min after the start of adenosine infusion.
- Scintigraphic images were acquired at 10 min and then 4 hours after tracer injection using a 2-detector camera (Symbia-S, Siemens Japan, Tokyo, Japan or E.CAM, Toshiba, Nasu, Japan) equipped with a low-energy high-resolution parallel collimator.

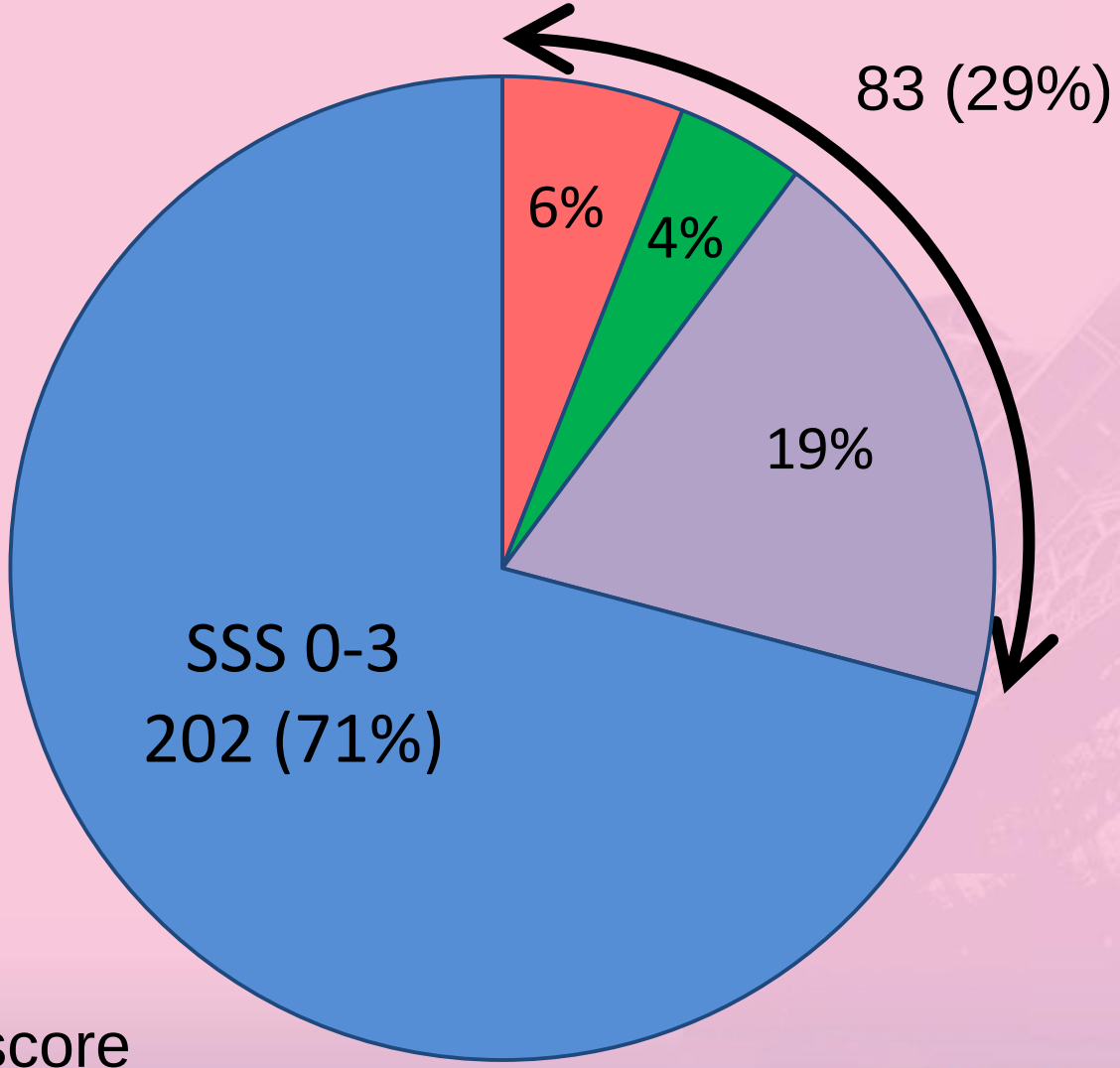
SPECT Complications and Measurements

	n=285	P-value
Minor complication		
Chest discomfort	5 (2%)	
Palpitation	2 (1%)	
Flushing	4 (1%)	
Major complication		
Death	0	
Myocardial infarction	0	
Cerebral infarction	0	
Shock	0	
Asthma	0	
ECG change		
ST elevation	0	
ST depression	8 (3%)	
Atrioventricular block	3 (1%)	
Premature ventricular contraction	5 (2%)	
Supraventricular premature contraction	6 (2%)	
BP (mmHg) [resting/ peak]		
SBP	148±21/127±21	<0.001
DBP	77±15/68±14	<0.001
Heart rate (beats/min) [resting/ peak]	66±11/75±13	<0.001

Results of SPECT

Abnormal SPECT images were obtained for 83 patients (29%)

- 14≦SSS 17 (6%) (severely abnormal)
- SSS 9-13 12 (4%) (moderately abnormal)
- SSS 4-8 54 (19%) (mildly abnormal)
- SSS 0-3 202 (71%) (normal)

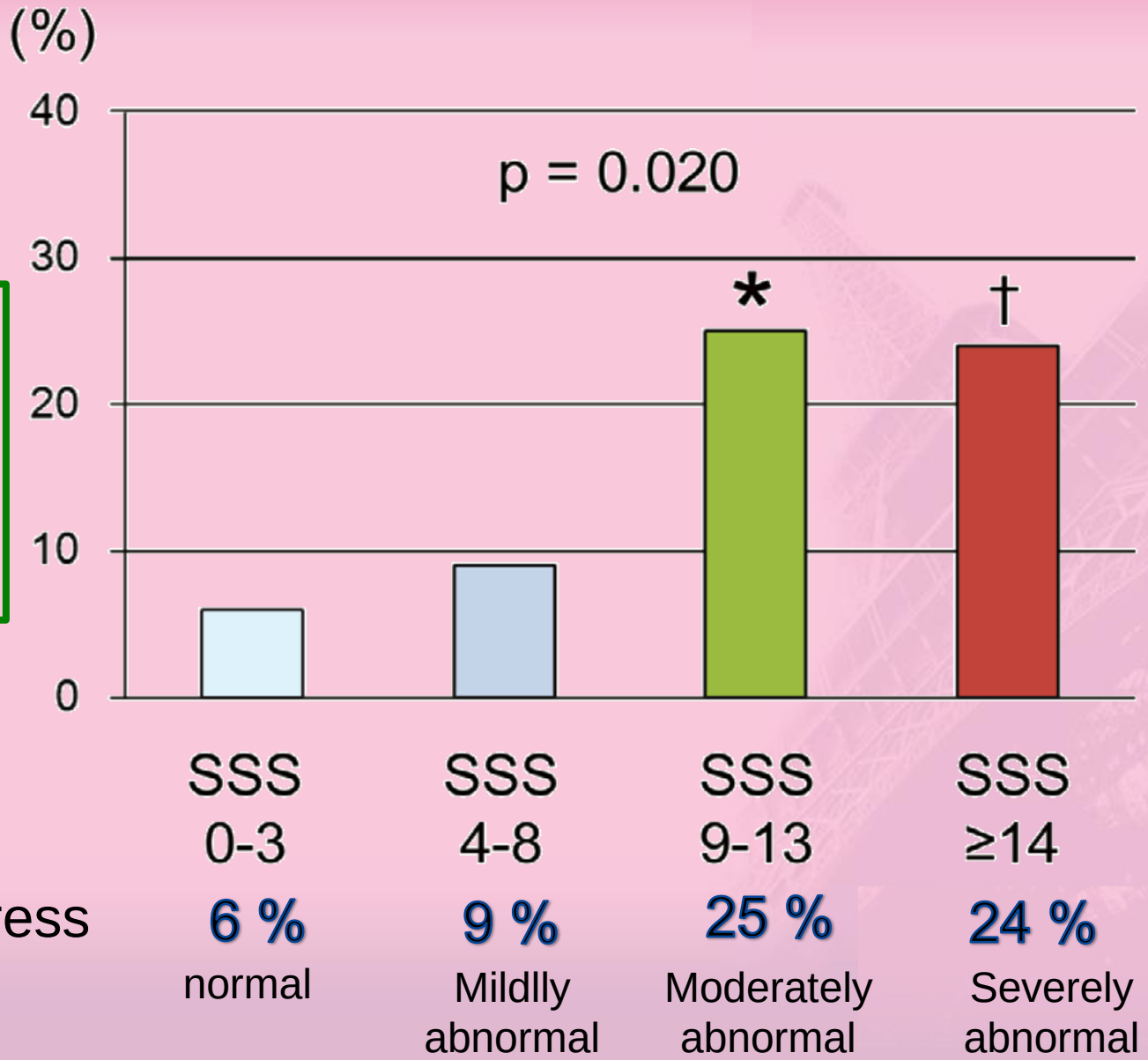


SSS : summed stress score

Incidences of death during 3-year follow-up

The median follow-up duration was 925 days (541–1,095 days)

24 patients (8%) died of cardiovascular disease

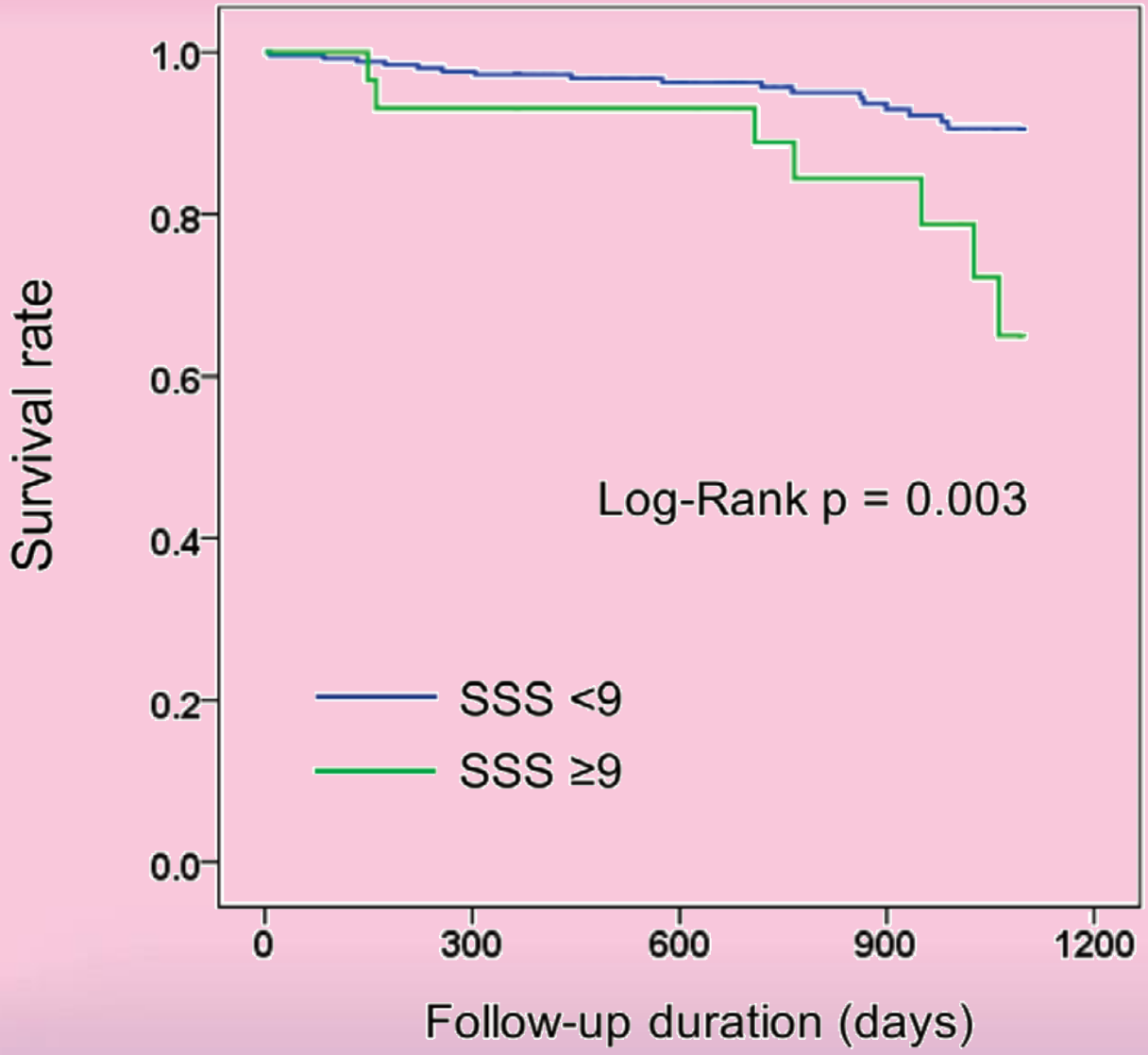


SSS : summed stress score

Patient Characteristics

	Survivors (n=261)	Cardiac death (n=24)	P-value
Age (years)	75±7	76±8	0.629
Male	217 (83%)	22 (92%)	0.390
Clinical history			
Hypertension	183 (70%)	18 (4%)	0.652
Diabetes	44 (17%)	10 (42%)	0.006
Brinkman index	700 (0–1,085)	615 (0–1,117)	0.355
COPD	25 (10%)	5 (21%)	0.153
Cerebrovascular disease	26 (10%)	2 (9%)	1.000
eGFR (ml · min–1 · 1.73 m–2)	62±20	47±25	0.001
CKD ≥ stage 3	125 (48%)	17 (71%)	0.034
LVEF <45%	8 (3%)	2 (8%)	0.202
Stress myocardial perfusion SPECT			
SSS			0.020
0–3	190 (72%)	12 (50%)	
4–8	49 (19%)	5 (21%)	
9–13	9 (3%)	3 (13%)	
≥14	13 (5)	4 (17%)	

Comparison of cumulative 3-year survival rates

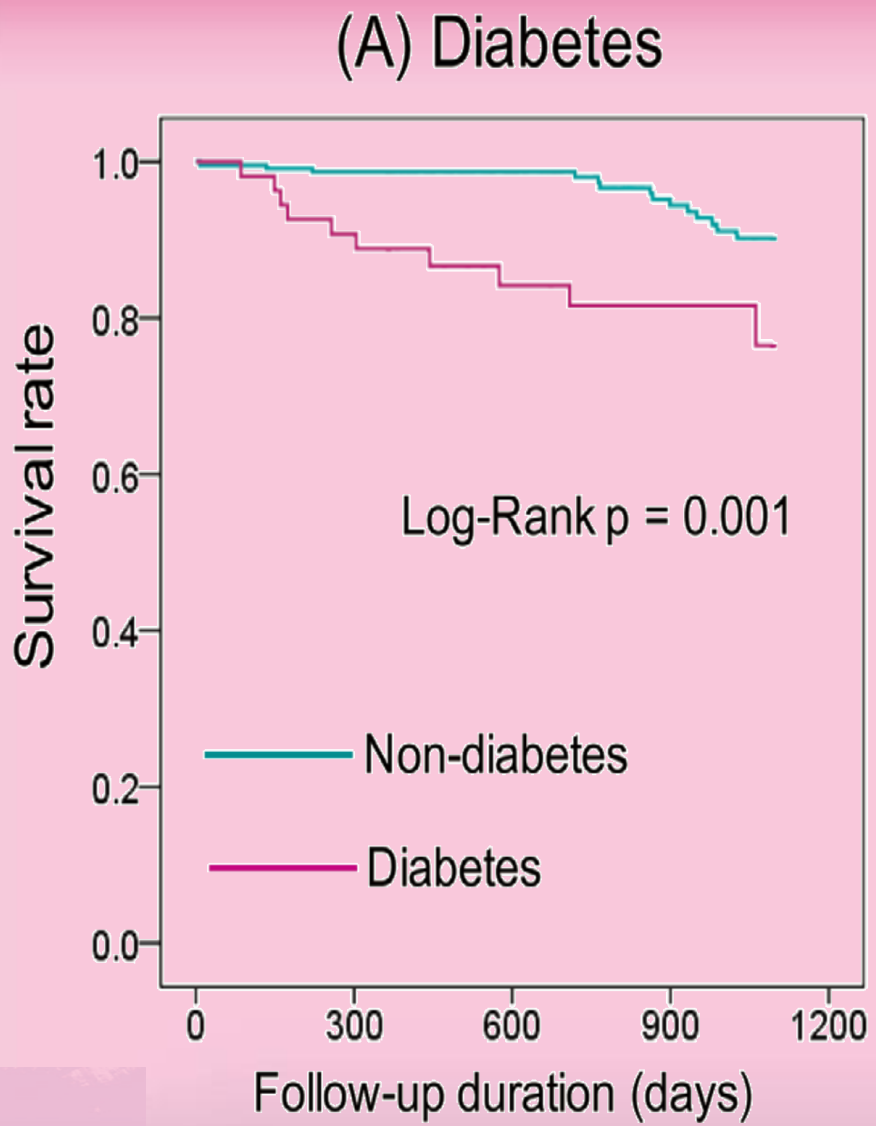


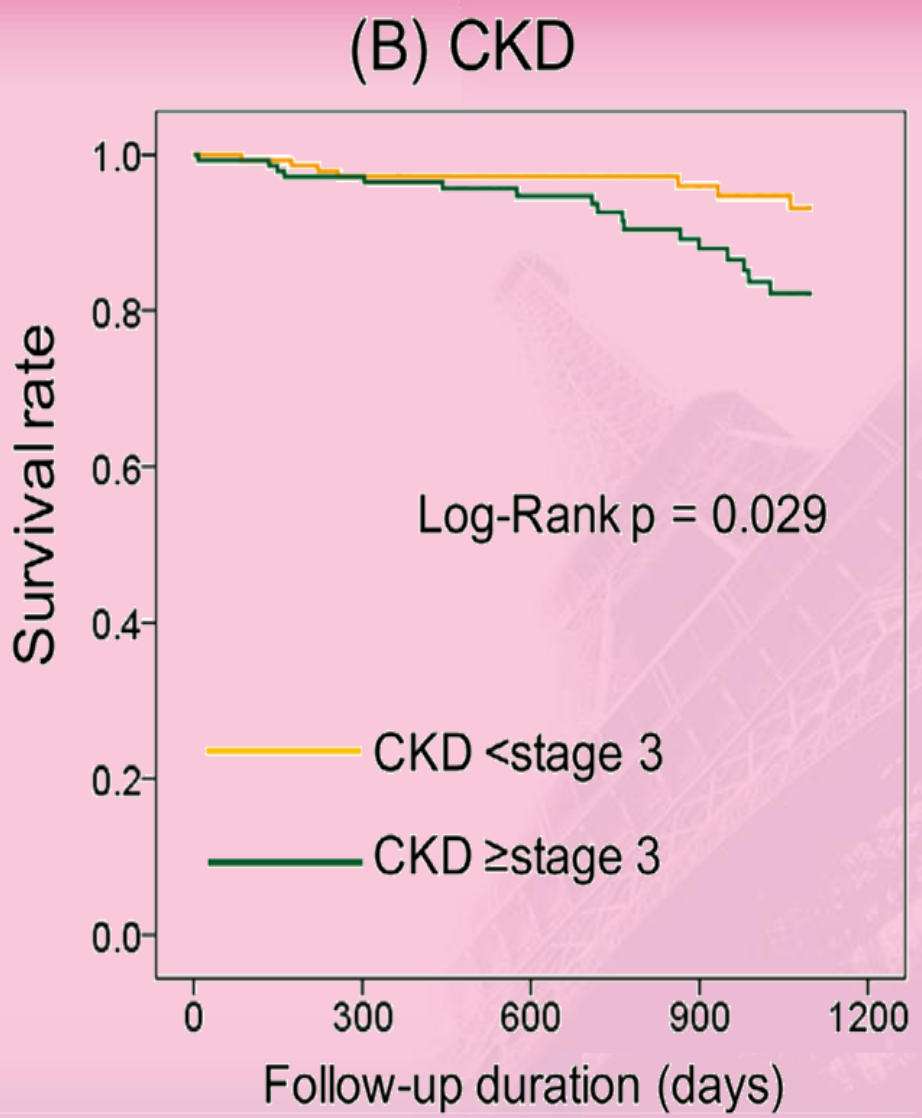
SSS low group
SSS < 9

SSS high group
SSS≧9

SSS : summed stress score

Comparison of cumulative 3-year survival rates





Predictors for Cardiac Death : Multivariate Cox Proportional Hazards Analysis

	Univariate		Multivariate	
	HR (95% CI)	P-value	HR (95% CI)	P-value
Age >70 years	3.9 (0.91–16.5)	0.067	3.0 (0.69–13.1)	0.144
Male	2.6 (0.60–10.9)	0.202		
Hypertension	1.3 (0.53–3.4)	0.541		
Diabetes	3.5 (1.5–7.8)	0.001	4.2 (1.8–9.7)	0.001
Brinkman index ≥800	0.97 (0.43–2.2)	0.943		
Cerebrovascular disease	1.0 (0.24–4.3)	0.982		
CKD ≥stage 3	2.6 (1.1–6.2)	0.029	3.0 (1.2–7.4)	0.020
LVEF <45%	2.7 (0.64–11.6)	0.177		
SSS ≥9	3.5 (1.5–8.5)	0.003	4.1 (1.7–10.1)	0.002
EVAR	1.2 (0.53–2.6)	0.688		

Conclusion

1. Preoperative pharmacologic stress myocardial perfusion SPECT is not only safe, but also a useful method to predict long-term cardiovascular mortality for patients undergoing elective AAA repair.
2. Patients with summed stress score (SSS) ≥9, as well as diabetes or CKD, are at high risk after elective AAA repair.
3. We need a careful follow-up and intensive treatment for patients with such high risk patients to improve their prognosis.

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