Comparison of the cardioprotective properties of Propofol and Sevoflurane in patients undergoing coronary surgery with cardiopulmonary bypass

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	Propofol	Sevoflurane	P
Diabetes Mellitus	2 (6.7%)	10 (32.3%)	0.011
Coronary disease	24 (80%)	20 (64.5%)	0.040
Mean arterial blood pressure pro-operatively	103.9±21.1	92.8±18.4	0.042
Diastolic arterial blood pressure 4 hrs post-operatively	56.9±11.1	49.4±8.1	0.019
Central venous pressure pro-operatively	4±3.4	9.2±1.5	0.001
SPO ₂ 2 hrs post-operatively	99±1.3	99.5±0.9	0.017
Troponine levels - 8 hrs post-operatively	1202.7±1551.7	121.9±135.4	0.008
Dobutamine levels - 4 hrs post-operatively	16.1±7.3	20.5±6.4	0.04
VAS scale	2.8±2.3	4.4±2.8	0.020
Post-operative dose of anaesthesia	3.9±4.1	2.5±1.9	0.030

Background: The intravenous propofol and the inhaled sevoflurane are known anesthetic agents that are commonly used to induce patients in anesthesia in cardiosurgery including bypass graft. A number of studies have been conducted in order to compare these two drugs for their cardioprotective properties, with controversial results. So, it is not clear yet, which of these two medicines (propofol or sevoflurane) provides better cardioprotection in patients who undergo cardiac bypass graft surgery with extracorporeal circulation.

Goal of Study: The aim of this study was to compare the anesthetic agents, sevoflurane and propofol, in cardiosurgery with bypass graft for their cardioprotective properties and for their ability to maintain the patient`s hemodynamic stability during the surgery.

Materials and methods: This is a double-blind, prospective, randomized and controlled clinical trial conducted in a large general hospital of Athens, Greece. The sample of the study consisted of 61 patients who underwent CABG and were anaesthetized with either propofol or sevoflurane. The exclusion criteria of the study were:

- age lower than 18 years,
- off-pump CABG,
- other type of cardiac surgery except CABG,
- use of anaesthetic drug other than propofol or sevoflurane,
- no sign the written informed consent

Results: The propofol group had significantly higher diastolic blood pressure one hour (64.4±11.4 vs 56.9±12.5 mmHg, p< 0.05) and 4 hours after the start of the surgery (55.6 ±9.7 vs 48.4±7.7 mmHg, p< 0.05) and received significantly higher dose of postoperative anesthesia (4.3±4.3 vs 2.5±1.9 ml/hr, p< 0.05) than the sevoflurane group. Also, the patients who received propofol had significantly higher troponin concentration 8 hours after the end of surgery than the sevoflurane group (1202.7±551.7 vs 175.5±139.3ng/ml, p < 0.05). Patients who received sevoflurane compared with propofol group had significantly higher levels of oxygen saturation two hours after the start of surgery (99.6±0.7 vs 98.9±1.3%, p< 0.05), higher dose of dobutamine four hours after the start of surgery (21.1±6.3 vs 16.3±7.7 mg, p < 0,05) and higher VAS-pain scale scoring after extubation (4.6±2.8 vs 3.1±2.4, p<0.05).

References

De Hert S, et al. A comparison of volatile and non volatile agents for cardioprotection during on-pump coronary surgery. Anaesthesia 2009; 64:953–60.

Yildirim V, et al. Cardioprotective effects of sevoflurane, isoflurane, and propofol in coronary surgery patients: a randomized controlled study. Heart Surg Forum 2009;12:E1-9.

Soro M, et al. Cardioprotective effect of sevoflurane and midazolame during anaesthesia and the postoperative period in coronary bypass graft surgery: a double-blind randomised study. Eur J Anaesthesiol 2012;29:561-9.

Discussion: The results of our study suggest that sevoflurane is a more cardioprotective sedation drug than propofol. We found significant difference between troponin levels before induction of anaesthesia and 4 hours after the completion of the operation for the sevoflurane and not for the propofol. Although patients who received sevoflurane had almost double to triple troponin levels than patients who received propofol, the concentration of troponin in the blood of patients with sevoflurane was almost half in relation to the patients with propofol. This is a strong evidence for the cardioprotective properties of sevoflurane.

There are studies indicating the cardioprotective effects of sevoflurane (Soro et al., 2012), other support the administration of propofol (Yildirim et al., 2009) and others found no difference between the two drugs (De Hert et al., 2009).

Table. Pre-operative demographics.

Variables	Propofol	Sevoflurane
Age (years)	66.3±11.5	66.4±10.3
Male sex (%)	24 (77.4)	25 (80.6)
Smoking (%)	18 (58.1)	16 (51.6)
Acute myocardial infarction (%)	2 (6.5)	7 (22.6)
Cardiac output	50.9±10.6	49.4±11.1
Duration of anaesthesia (min)	262.7±66.9	267.9±66.9
Number of grafts	2.6±0.8	2.5±0.8
CPB time (min)	125,6±53,2	127,8±62,2
Aortic cross clamp time (min)	69,4±21,6	69,6±24,8
Operation time (min)	266.9±69.3	268.3±65.9

Conclusion: A sevoflurane based anaesthesia in patients undergoing coronary bypass graft surgery may benefit patients maintaining aimodynamic stability during surgery and by decreasing the troponin release 8 hrs after surgery, supporting the cardioprotective effects of sevoflurane over propofol.