



**Karolinska
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Institutionen för Molekylär Medicin och Kirurgi

Sedation with volatile anesthetics in cardiothoracic ICU patients

AKADEMISK AVHANDLING

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av

Jan Hellström

Leg. Läkare

Huvudhandledare:

Med Dr Peter Sackey
Karolinska Institutet
Institutionen för Fysiologi och Farmakologi
Enheten för Anestesiologi och Intensivvård

Bihandledare:

Docent Anders Öwall
Karolinska Institutet
Institutionen för Molekylär Medicin och Kirurgi
Enheten för Thoraxanestesiologi

Fakultetsopponent:

Professor Sven-Erik Ricksten
Sahlgrenska Akademin Göteborgs Universitet
Institutionen för Kliniska Vetenskaper
Enheten för Anestesiologi och Intensivvård

Betygsnämnd:

Professor Michael Haney
Umeå Universitet
Institutionen för Kirurgisk och Perioperativ
Vetenskap, Enheten för Anestesiologi och
Intensivvård

Docent Hans Barle
Karolinska Institutet
Institutionen för Kliniska Vetenskaper
Danderyds Sjukhus

Professor Sten Rubertsson
Uppsala Universitet
Institutionen för Kirurgiska Vetenskaper,
Enheten för Anestesiologi och Intensivvård

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ABSTRACT

Volatile anaesthetics have been reported to provide protection against myocardial ischemia and reperfusion injury. This effect has been demonstrated in experimental studies when the volatile anaesthetics were provided either before (preconditioning) or after the ischemic period (postconditioning). Clinical trials of volatile anaesthetics versus intravenous anaesthesia for coronary artery bypass grafting (CABG) have reported reduced postoperative release of troponin, a biomarker of myocardial necrosis. The most pronounced reduction was achieved when sevoflurane was administered throughout surgery. Hence, it could be of interest to investigate whether additional myocardial protection could be achieved in cardiothoracic intensive care unit (ICU) patients following CABG by prolonging administration of volatile anaesthetics to include the period of routine postoperative sedation. The AnaConDa® is an anaesthetic conserving device that enables sedation with isoflurane or sevoflurane with common ICU ventilators. This method has been demonstrated to be feasible for sedation during mechanical ventilation in the general ICU. Isoflurane has also been used clinically to provide inhaled sedation during therapeutic hypothermia following cardiac arrest, but there are no evaluations or publications of this treatment. The AnaConDa® requires scavenging of volatile anaesthetics in expired breathing air. The use of an adsorbing canister with the filtered air released in the ICU room has not been well described.

The aim of this thesis was to investigate clinical and occupational aspects of inhaled sedation with volatile anaesthetics in cardiothoracic ICU patients.

We conducted a randomized clinical trial of short-term sevoflurane sedation versus propofol following CABG. While no significant differences were found in cardiac adverse events or troponin-T values sampled 12 hours following surgery, a reduced change from pre- to postoperative troponin-T values was demonstrated in a post-hoc analysis. Wake-up times were shorter in the sevoflurane-sedated group, but did not affect ICU or hospital stay in our short-term sedation. While sevoflurane-sedated patients were able to follow verbal command earlier, memories assessed with the validated ICU-Memory Tool were similar after sedation. In a retrospective study of isoflurane sedation during therapeutic hypothermia following cardiac arrest, it appeared that the early neurologic assessment with the Glasgow Coma Scale performed within 24 hours from reaching normal body temperature was consistent with the conventional assessment following 72 hours. We conducted an observational study of occupational exposure to sevoflurane during its use to provide sedation in the ICU and demonstrated that passive scavenging with an adsorbing canister (CONTRAfluran™) provided minimal exposure to sevoflurane compared to no scavenging. Nurses in both groups had exposures below the Swedish occupational exposure limit, but only nurses working with patients without scavenging reported adverse symptoms. Smell of sevoflurane was the most frequent adverse symptom.

Keywords: sevoflurane, sedation, myocardial protection, postconditioning, occupational exposure, therapeutic hypothermia,

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