PRECONDITIONING EFFECTS OF ANESTHETICS: FOCUS ON CARDIAC SURGERY

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Cardio-protection in anesthetics is an area which has got a lot of attention during the last years. A search in pubmed reveals 2,627 hits on cardio-protective effect comes, while preconditioning comes out with 6,260 hits – that’s a lot of words, so what have we learned? The talk of cardiac protection in cardiac surgery will focus on publications, predominantly used study parameters, the validity of these parameters and data from our own projects.

The primary focus has been inhalation anesthetics and more than half the studies are in some way related to those. Most studies seem to agree that the use of inhalation anesthetics is superior to other anesthetic modalities. However, this is not necessarily the truth. Questions have been raised concerning some studies and not all studies have found Sevoflurane superior to i.e. Propofol when it comes to cardio-protection. In 2005 Kevin at all published an interesting article of anesthetics drugs and anesthetic regimes and the influence on cardiac injury, among them the use of Propofol and further, some studies has found that Propofol, most likely due to it’s anti-oxidant effect, poses cardio-protective properties, which could be equivalent to inhalation anesthetics.

But how is actually the cardio-protective effect evaluated in all these studies? Predominantly are used time in ICU, time in Hospital, biochemical markers for myocardial injury and the frequency of atrial fibrillation, but very few hard data like mortality, myocardial infarction (MI) and stroke.

In a high profile study, it was found that Sevoflurane reduced, in-hospital time from 8 to 6.5 days and time in ICU from 48 to 36 hours. However, in our hospital 90 % are discharged from hospital at day 6 and 80% are discharged from ICU within 24 hours,
which indicate that discharge is guided more by local policy and systems than patient condition. Thus time parameters is less valuable in research

Biochemical markers are indicators of myocardial damage and MI, but the question is whether they are useful in cardiac surgery and what level to expect. A main problem is that the “official” level of biochemical markers indicating MI is lower than used in most studies and thus MI might not be a valid parameter in cardiac surgery patients and the biochemical markers need a consensus when it comes to levels of MI in relation to cardiac surgery.

We have recently published an outcome study of Propofol versus Sevoflurane Anesthesia in 10,535 single cardiac procedures. Patients were stratified according EuroSCORE and outcome parameters were 30-day mortality, incidence of postoperative MI and postoperative arrhythmias – which is relatively hard data compared to previous studies.

Regarding ventilation time the predominant findings was, that patient supplemented with epidural anesthesia was extubated significant earlier than patients without epidural and we found a non-significant marginally lower ventilation time in Propofol patients. However, this had no impact on the length of stay in ICU. In all groups 80 % of patients were discharged from ICU within 24 hours.

The difference in overall 30-day mortality between anesthetic groups was not statistically significant. Patients with pre-OP MI < 90 days before surgery had an expected statistically significant higher mortality than all other patients. Further, patients without previous MI had a significantly lower mortality after Sevoflurane. Patients with pre-OP unstable angina had a significantly higher mortality compared to patients without unstable angina and in patients without unstable angina the mortality was significantly lower after Sevoflurane.

Evaluating causes of in-hospital death we found that patients in the Sevoflurane group had a significantly lower fraction of cardiac death, which could be a preconditioning effect. However, when combining mortality due to infection, pulmonary or renal causes,
areas where anti-oxidants could be of benefit, we found that patients dying from these causes were significant lower after Propofol.

Our conclusion was that for non-ischaemic elective single procedures Sevoflurane seems superior. For ischaemic elective patients we have no clear answer while for severe ischaemic and or acute patients, Propofol seems the best choice. Further for multiple procedures aortic surgery seems to benefit from Propofol while CABG plus valve is more unclear.