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EDITORIAL VIEW

Cardiac protection: a fact or myth?

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ABSTRACT

A high rate of peri-operative mortality has been noted in patients with coronary artery disease, which warrants specific measures to prevent cardiac deaths in these patients. Perioperative cardiac protection can be achieved through either revascularization (CABG/PCI) or by pharmacologic means. While the first is only justified by medical reasons, the success of different drugs has proven less than desired. A plan is suggested to manage the unexpected rise of troponin in the postoperative period.

Key words: Cardiac protection; Perioperative; Coronary revascularization; Beta blockers; Troponin

Abbreviations: CAD (coronary artery disease); ACC/AHA (American College of Cardiology and the American Heart Association; CARP (Coronary Artery Revascularization Prophylaxis)

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The POISE 1 study have shown that 6.9% of patients at risk of, or with known coronary artery disease (CAD) suffer from cardiac death or nonfatal myocardial infarction (MI) within 30 days of non-cardiac surgery.[1] Another 3.5% suffer from other cardiovascular complication e.g. stroke, new AF or cardiac failure.

Cardiac protection options include coronary revascularization and pharmacological measures. In the 2014 ACC/AHA guidelines, revascularization before non-cardiac surgery is recommended, "if it is justified by medical reasons irrespective of the planned surgery".[2] Both the Coronary Artery Revascularization Prophylaxis (CARP) and the Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation (COURAGE) studies concluded that "in stable CAD, a strategy of revascularization before elective vascular surgery cannot be recommended".[3,4]

Guidelines remain vague about the superiority of either Coronary Artery Bypass Grafting (CABG) or stenting if revascularization was chosen. Coronary Artery Bypass Grafting (CABG) conveys improved survival when done for medical reasons and thus may be the better option. If for whatever reason stenting was chosen, drug-eluting stents should be avoided for the mandatory 12 months use of dual antiplatelet therapy. A bare metal (requiring only 6 weeks) may be better. Effectiveness of either type for perioperative cardiac protection is doubtful.[5]

Pharmacologic protection could be achieved by drugs reducing heart rate and preventing hypertension, anti-inflammatory drugs (aspirin/statins) or by preconditioning.

Both Perioperative Ischemic Evaluation and a recent meta-analysis of RCTs[6] have shown that beta blockers (β-b) reduce the risk of perioperative MI on the expense of increasing all-cause mortality and strokes. Both the American and European current guidelines agreed that "continuation of chronic β-b therapy" is the only indication that achieves class I recommendation. Its initiation "may be useful" (Class IIa) in high risk patients for high risk surgery with 2 conditions: earlier start and titration to a heart rate of 60-65/min. Even with such approach, β-b do not seem to improve outcome.[7]

In Perioperative Ischemic Evaluation 2, alpha2-adrenoceptor agonists (clonidine) did not confer cardiac protection,[8] but hypotension and bradycardia were significant. Ivabradine, acting on pacemaker

cells responsible for its spontaneous depolarization (funny channels) will reduce the heart rate without hypotension. However, there is only very limited data in the perioperative setting.[9,10]

Inflammatory mediators due to surgery can disrupt atheromatous plaques precipitating acute cardiac events. Aspirin in POISE 2 failed to protect the myocardium. It also increased bleeding risk. Current guidelines recommend against its initiation and only continued in either carotid/cardiac surgery or if indicated after stenting.[2,3]

Statins decrease progression of atheromatous lesions and have a pleiotropic (anti-inflammatory) effect. These are indicated for both primary and secondary prevention of cardiac disease,[11] the risk of developing diabetes is outweighed by averting vascular events.[12] Multiple observational studies[13] in addition to a recent meta-analysis[14] showed statins to decrease mortality, MI, new AF as well as reducing length of hospital stay. Most of these studies are in cardiac surgery, but POISE 3 will address it in non-cardiac surgery.[15] Statins should be continued perioperatively as their withdrawal increases postoperative cardiac events.[16] Initiation is recommended few weeks before vascular surgery as well as for patients with at least one clinical risk factor for elevated risk procedures.[2]

Tranexamic acid has anti-plasminogen effect, which decreases bleeding and reduces the risk of arterial thrombosis including coronary thrombosis in major trauma patients.16 POISE 3 will investigate its cardiovascular protective potential in non-cardiac surgery.[15]

Myocardial preconditioning: Damage by prolonged ischemia can be prevented by a preceding short period of ischemia or by pharmacological agents (e.g. volatile anesthetics). Despite repeated laboratory demonstrations and better outcome when volatiles are used,[18] clinical success is inconsistent.[19]

As perioperative pharmacologic protection, with the exception of statins, is proving more elusive, an alternative approach is to monitor high risk patients by serial troponin assays. This is recommended in both the AHA/ACC, ESA/ESC guidelines as well as in a 2017 Canadian guidelines.[20] Recent evidence shows that even a modest elevation of postoperative troponin is associated with increased mortality and other major adverse cardiac events.[21] On the other hand, intensified treatment in response to such elevations greatly enhances event-free survival in vascular surgical patients.[22] In absence of clear guidelines, treatment of such cases should follow the same approach to treating acute phase MI outside the surgical setting, e.g. statins, ACE inhibitors, titrated β-b and anti-platelets.[23]

CONCLUSION

Preoperative coronary revascularization is only indicated if it is justified by medical reasons irrespective of impending surgery. A surgical approach is likely (but not certain) to offer better protection than stenting. However, the risk of surgical revascularization must then be taken into consideration.

Pharmacologic protection is more elusive than previously thought. It is recommended to continue both β-b and statins for those patients on chronic treatment. Initiating β-b may be useful for high risk patients going for high risk surgery on two conditions: starting early and titrating carefully. It makes sense to start statins in high risk patients going for high risk surgery as such patients should be on long term statins therapy.

How to manage raised troponin postoperatively is not clear, but it may be that initiating statins, aspirin, an ACE inhibitor and a β-b under strict supervision would reduce the risk of further cardiac episodes.

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Apicare Journal on social media-1

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Both the profile and the group proliferated rapidly, and the reputation of the journal spread through all continents of the globe.

The journal runs two other groups, to fulfil the growing requirements of our community; 'Anaesthesia Jobs' was created to post and to allow the recruiters post the vacancies and opportunities of jobs for the anesthesiologists, intensivists and pain specialists. 'Pain Fellows' fulfils the needs of the new as well as experienced pain enthusiasts of the current updates in the pain and pain management fields. The two groups have 7020 and 6819 members at the time of writing these words.