Thirty-day mortality following unselected non-cardiac surgery in patients 65 years and older has been reported at 1.9% (95% CI 1.7-2.1%). In such patients, postoperative troponin elevation has a very strong correlation with associated 30-day mortality. Considering that annually more than 200 million major surgical procedures are performed globally, it is clear that this equates to a significant public health burden. The accurate identification of patients at risk of peri-operative morbidity offers many advantages. First, both the patient and the physician can perform an appropriate risk-benefit analysis based on the expected surgical benefit in relation to the surgical risk. Surgery may then be declined, deferred or modified to maximize patient benefit. Second, pre-operative identification of high-risk patients enables physicians to direct their efforts towards those patients most likely to benefit from additional interventions. Finally, postoperative management, monitoring and potential therapies may be individualized according to the patient’s predicted risk of postoperative morbidity and mortality.

Data: utility of predictive troponin levels in vascular surgery patients

Biccard, et al, Anesthesia, 2014

Troponins predict cardiac complications after non-cardiac surgery

- Tropovasc and BASEL-PMI Investigators
- Measured troponin levels in a prospective blinded fashion in 1022 patients undergoing non-cardiac surgery
- Major cardiac complications occurred overall in 11%, but in 24% (58/243) of patients undergoing vascular surgery.

Vascular and Endovascular Surgery
Troponins predict cardiac complications after non-cardiac surgery
Gualandro et al, Am Heart J, 2018

Among patients undergoing vascular surgery, preoperative troponin elevation was an independent predictor of cardiac complications (OR 1.5).

Increased accuracy of prediction in vascular surgery as opposed to non-vascular surgery patients.

Vascular and Endovascular Surgery
Perioperative levels and changes in troponin levels in open vascular surgery patients
CONCLUSIONS:

In vascular surgery patients, perioperative troponin change outperforms single measurements before and after the surgical procedure in prediction of imminent MACE.

A combination of RCRI with the absolute change of troponin can improve the predictive accuracy of the clinical score alone significantly.

Conclusion: The risk predictive power of troponin levels and change can facilitate detection of patients at highest risk for perioperative myocardial ischemia.

Evaluated whether elevated cardiac troponin was predictive of an increased risk of death or amputation in patients with acute limb ischemia.

294 ALI patients, all treated with endovascular intervention

In hospital mortality – 3.9%

Amputation – 5.1%

Patients who died or required amputation more frequently presented with elevated troponin ≥0.01 ng/mL (52.2% vs. 25.5%)

After controlling for age, sex, and other risk factors, the relationship between troponin and worse in hospital outcome remained significant (hazard ratio 3.4).
Elevated troponin levels correlated with in hospital death or amputation, as well as amputation free survival.

Among patients with ALI and without clinical symptoms suggesting myocardial ischemia, elevated troponin levels at the time of hospital admission can identify patients at risk of in hospital death or amputation.

- 152 patients with CLI and no evidence of active coronary disease.
- Admission levels of troponin obtained.
- Primary endpoint was mortality over two years.
- 52 patients (32.4%) had an elevated troponin.
- Measurement of troponin on admission was a significant independent predictor of survival.
- Hazard ratio 4.2
Admission troponin level was a significant predictor of subsequent mortality in critical limb ischemia patients. The predominant cause of death was cardiac. The value of the troponin test was maintained even when controlling for other risk factors. Clinical utility included identification of patients at high cardiac risk enabling primary and secondary preventive strategies to be implemented. Realistic awareness of likely long-term prognosis is invaluable when planning suitability for surgical or endovascular intervention.

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Troponins in CLI patients
- Admission troponin level was a significant predictor of subsequent mortality in critical limb ischemia patients.
- The predominant cause of death was cardiac.
- The value of the troponin test was maintained even when controlling for other risk factors.
- Clinical utility included identification of patients at high cardiac risk enabling primary and secondary preventive strategies to be implemented.
- Realistic awareness of likely long-term prognosis is invaluable when planning suitability for surgical or endovascular intervention.

Sarveswaran et al, Eur J Vasc Endovasc Surg, 2007

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Goal to evaluate the benefit of routine preoperative cardiac troponin measurement in patients undergoing major lower extremity amputation for CLI.
- All patients were without evidence of unstable CAD.
- 10 of 44 patients had a non-fatal MI or died from a cardiac cause.
- A rise in preoperative troponin was associated with a very poor outcome, and was the only significant predictor of postoperative cardiac events.

Gibson et al, Eur J Vasc Endovasc Surg, 2006

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Conclusion:
- Who to screen?
- Cost effectiveness?
- In patients with elevated troponin levels, what is the appropriate course of action?

RCRI is a routinely used risk stratification tool.
- Attempted to find the best model for predicting 3-month cardiac complications in elective vascular surgery patients.
- During the first three months after surgery 29 patients (23.8%) had 50 cardiac complications.
- ROC analysis showed that a combination of RCRI with troponin level had good discriminatory power.

Golubovic et al, Biomed Res Int 2018

Vascular and Endovascular Surgery

Adding biomarkers to RCRI
Adding biomarkers to RCRI

- Adding biomarker levels to clinical scoring systems can improve preoperative risk assessment.

Thank you!