Troponin Elevations in the Peri-operative Patient

Associate Professor Ronald Dick
Case for Discussion

74 yo retired Anaesthetist
Elective Total Hip Replacement
Past History of Mild Hypertension
Uneventful operation until transient mild post op hypotension
Med Fellow called
ECG no Change, U + E Normal
Troponin 28 ng/ml (15 upper limit)
A Case of Hypertroponaemia
Where to now??
Clinical Options

Ignore it
Repeat it in 6 hours
Transfer to monitored bed
Urgent Cardiology referral for Coronary angiography
Discussion

What is Troponin?
What causes it to be elevated?
Does a perioperative elevation lead to adverse outcomes?
The way forward from here
Cardiac Ischaemia Biomarkers

Creatinine Kinase (CK)
Creatinine Kinase MB (CKMB)
Troponin TnT, TnI, Tnc
Hs cTnt (high affinity antibodies)
Troponin
Troponin
Intracellular Compartmentation of Cardiac troponin T and Its Release Kinetics in Patients with Reperfused and Nonreperfused Myocardial Infarction

Hugo A. Katus, MD, Andrew Remppis, MD, Thomas Scheffold, MD, Klaus W. Diederich, MD, and Wolfgang Kuebler, MD

previous study on the diagnostic efficiency after the onset of pain. This early troponin
Troponin Elevations

Elevations suggest myocardial injury

1. Primary Ischaemic Injury
   Thrombotic Arterial Occlusion (STEMI, NSTEMI)

2. Secondary Ischaemic Injury
   Post Intervention CABG or PCI

3. Non Ischaemic Cardiac Injury
Trononin Elevations
Secondary Ischaemic Injury

Sympathomimetics
Pulmonary Embolism
Coronary Artery Spasm
Vasculitidies
End Stage Renal Failure
Acute Heart Failure
Extreme Endurance Exercise
Trononin Elevations
Non Ischaemic Cardiac Injury

Myocarditis
Infection
Autoimmune
Drug induced
Toxins
Cardiac Trauma
Metabolic /Toxic
VISION

1933

2007
Association Between Postoperative Troponin Levels and 30-Day Mortality Among Patients Undergoing Noncardiac Surgery

The Vascular Events In Noncardiac Surgery Patients Cohort Evaluation (VISION) Study Investigators

Context Of the 200 million adults worldwide who undergo noncardiac surgery each year, more than 1 million will die within 30 days.

Objective To determine the relationship between the peak fourth-generation troponin T (TnT) measurement in the first 3 days after noncardiac surgery and 30-day mortality.

Design, Setting, and Participants A prospective, international cohort study that enrolled patients from August 6, 2007, to January 11, 2011. Eligible patients were aged 18 years and older, scheduled to undergo noncardiac surgery for a noncardiac condition and planned to stay in the hospital for less than 30 days.
VISION Findings

15133 patients

- 24.2% > 75 years
- 51.5% Women
- 50.9% Hypertensive
- 19.5% Diabetes
- 26.5% Active cancer

(Orthopaedic 20.4%, Major General 20.3%, Low Risk 39.4%)
VISION Study

15133 Patients
282 deaths by 30 days (1.9%)
127 deaths Vascular
155 deaths Non-Vascular
   Pneumonia day 6
   Sepsis day 7
VISION Findings

<table>
<thead>
<tr>
<th>TnT Level</th>
<th>Percentage of Cohort</th>
<th>30 Day Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01 ng/ml</td>
<td>88.4%</td>
<td>1.0%</td>
</tr>
<tr>
<td>0.02 ng/ml</td>
<td>3.3%</td>
<td>4.0%</td>
</tr>
<tr>
<td>0.03 - 0.29 ng/ml</td>
<td>7.4%</td>
<td>9.3%</td>
</tr>
<tr>
<td>&gt; 0.30 ng/ml</td>
<td>0.9%</td>
<td>16.9%</td>
</tr>
</tbody>
</table>

No Real effective with eGFR considered
VISION Study

Perioperative Troponin Elevations equated to mortality
Gradient of risk
Limitation of no pre-operative cTnT
? Maybe they were already sick
Background Elevated cTnT

Coronary Artery Disease

High-sensitive cardiac troponin T and its relations to cardiovascular risk factors, morbidity, and mortality in elderly men

Kai M. Eggers, MD, PhD, a Jinan Al-Shakarchi, MD, a Lars Berglund, PhD, b Bertil Lindahl, MD, PhD, b Agneta Siegbahn, MD, PhD, a Lars Wallentin, MD, PhD, b and Björn Zethelius, MD, PhD c Uppsala, Sweden

Background Cardiac troponin is emerging as risk indicator in community-dwelling populations. In this study, we investigated the associations of cardiac troponin T (cTnT) to cardiovascular (CV) disease and outcome in elderly men.

Methods Cardiac troponin T was measured using a high-sensitive assay in 940 men aged 71 years participating in the Uppsala Longitudinal Study of Adult Men. We assessed both the cross-sectional associations of cTnT to CV risk factors an
The effect of age on hsTnT levels

Effect of older age on diagnostic and prognostic performance of high-sensitivity troponin T in patients presenting to an emergency department

Jeanette Normann, MD, a Matthias Mueller, MD, a Moritz Biener, MD, Mehrshad Vafaie, MD, Hugo A. Katus, MD, and Evangelos Giannitsis, MD Heidelberg, Germany

**Background** The effect of age on diagnostic and prognostic performance of high-sensitivity cardiac troponin T (hsTnT) has not been addressed adequately, so far.

**Prevalence of Elevated Troponin:** >75 y 89.1%, <75 y 73.3%
**ACS more likely in Younger patient**
**Conclusion elevated cTnT in the elderly higher prevalence of Non ACS**
Clinical Investigation

High-sensitivity cardiac troponin T in prediction and diagnosis of myocardial infarction and long-term mortality after noncardiac surgery

Peter Nagele, MD, MSc\textsuperscript{a}, \textsuperscript{g}, Frank Brown, BSc\textsuperscript{a}, \textsuperscript{g}, Brian F. Gage, MD, MSc\textsuperscript{c}, \textsuperscript{g}, David W. Gibson, BSc\textsuperscript{c}, J. Philip Miller, AB\textsuperscript{c}, \textsuperscript{d}, \textsuperscript{g}, Allan S. Jaffe, MD\textsuperscript{e}, Fred S. Apple, PhD\textsuperscript{a}, \textsuperscript{f}, Mitchell G. Scott, PhD\textsuperscript{b}, \textsuperscript{g}
**Preoperative hs-cTnT concentration**

- **< 14 ng/L (59% of patients):**
  - 2.5% Myocardial Infarction
  - 7.8% Postop. Troponin I elevation >0.07 µg/L

- **> 14 ng/L (41% of patients):**
  - 8.6% Myocardial Infarction
  - 21.9% Postop. Troponin I elevation >0.07 µg/L
Figure 4

A

MEN

preop. hs-cTnT > 15 ng/L

preop. hs-cTnT < 15 ng/L

0% 5% 10% 15% 20% 25% 30%
0 yrs 1 yrs 2 yrs 3 yrs

B

WOMEN

preop. hs-cTnT > 10 ng/L

preop. hs-cTnT < 10 ng/L

0% 5% 10% 15% 20% 25% 30%
0 yrs 1 yrs 2 yrs 3 yrs
So the way forward

1. No surgery for over 70 yo
2. All patients pre-operative cTnT
3. All patients a routine series of cTnt post operatively
4. Is this an area for Epworth Clinical research?
   Sub selecting a certain procedure with a standard age group
5. Or support your local interventional cardiologist and Cath them all because “you can’t be sure”