Blunt Cardiac Injury: Who, How, and What?

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Goals

• Understand the broad spectrum of blunt cardiac injury
• Recognize which populations are at risk
• Understand current screening guidelines
• Identify which patients need immediate treatment
The 3 Questions....

• **Whom** do you screen?
• **How** do you screen?
• **What do you do** when you screen positive?
Blunt Cardiac Injury

- Spectrum of injury

Contusion ➔ Coronary Artery ➔ Valve ➔ Cardiac Chamber Rupture ➔ Commotio Cordis
Injury Location

• Truisms:
  – Right heart > Left heart
  – Valves: aortic > mitral > tricuspid > pulmonary
  – Atrial rupture > ventricle rupture
Whom do you screen?

- Mechanism
  - Motor Vehicle Crash
  - Pedestrian vs auto
  - Fall
  - Direct impact

30 mph

30 feet
How do you screen?

- EKG
- Biomarkers
- ECHO?
- CT/MRI?
- Nuclear medicine scan?
EKG Findings in BCI

- NPV 95%
- Right sided EKG?

Biomarkers

- CK/MB
- Troponin T
- Troponin I
  - More specific for dx of BCI than TnT
  - When combined with EKG, PPV 100%

EAST Guidelines 2012

• Level 1
  – Admission EKG

• Level 2
  – New EKG abnormality should be monitored
  – Normal EKG and troponin I rules out BCI
  – Hemodynamic instability or persistent new arrhythmia should have ECHO
  – Sternal fracture alone does not warrant workup
  – CK-MB not useful
  – Nuclear medicine scans not generally useful

• Level 3
  – Troponin I should be measured routinely and if elevated, the patient should be admitted
  – CT/MRI can be used to differentiate BCI from acute MI
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<th>EKG</th>
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Treatment Options

- Arrhythmia
- Cardiac dysfunction
- Acute coronary syndrome
  - Catheterization/stenting
  - CABG
  - Avoid thrombolytics
- Valve/septum/wall rupture
  - Emergent surgical intervention
Screening Algorithm

Mechanism for BCI
Blunt chest trauma AND
- complaints of chest pain
- unstable
- arrhythmia on monitor

Unstable

FAST

Pericardial fluid?

YES

Median Sternotomy

NO

ECHO

Stable

EKG and Troponin

Abnormal

Minor

24 hr Telemetry

Major

ECHO

ACLS ICU

Normal

Discharge Home
The Case:

- 24 yo M high speed MVC – ran into brick wall, significant front end damage
- Unrestrained driver, found lying in front seat
- Initial BP on the scene 42/24  HR 65
- GCS 14
- Moving all extremities
- Obvious open right ankle fracture


The Case:

- Boarded and collared
- O2 via non-rebreather mask
- EKG performed
- IV access – 16g ante-cubital
- Bolus IVF – wide open
Ventricular rate: 121 BPM
PR interval: 80 ms
QRS duration: 66 ms
QT/QTC: 332/471 ms
P-R-T axes: 45 80 20

Sinus tachycardia with short PR
Otherwise normal ECG
Confirmed by Yadav, Neha (1002) on 11/18/2016 1:34:30 PM

Technician: A Smith
Test ID: 439227/k2

Referred by:

Confirmed By: Neha Yadav
Upon Arrival to Cook County Trauma:

- SBP 70s to low 100s
- HR 120
- GCS 15
- Spine not cleared due to distracting injury

- Airway - talking
- Breathing – bilateral breath sounds
- Circulation
  - Not so good....
  - Patient appears to be in shock
video
video
Blunt Cardiac Rupture

- Most die in the field
- Of those who survive to the hospital: 90% mortality
- Mortality of patients reaching OR: 68% mortality
- Presence of vital signs on arrival and rapid diagnosis are key to survival
Patient Follow up:

- Post op went to TICU
- POD#1 returned to OR with Orthopedics for repair of ankle fracture
- Extubated
- All chest tubes removed on POD#5
- Discharge home POD#8
Summary

• Blunt cardiac injury ranges from clinically irrelevant EKG changes to catastrophic structural disruption

• Need a high index of suspicion

• Screen with EKG and troponin

• If positive, need at least 24hr telemetry

• The most severe injuries require immediate surgical intervention!