Management of Penetrating Trauma and Pericarditis

Elizabeth Thomas, RN, CCRN, CEN
Vicki Moran, PhD, RN, MPH, CNE, APHN-BC
Pamela Golden, MSN-CS, APRN, CCRN-K, TCRN
DISCLOSURE

The speakers cannot identify any potential conflict of interest with any commercial products and/or provider of commercial services for this activity.

Our manuscript for the case study was accepted by *The Journal of Trauma Nursing* and will be published in 2017.
Trends in healthcare

Shift from \textit{volume based} to \textit{value-based} reimbursement.

- Pay for performance
- Incentives
- Bundle payments
- Comprehensive accreditations

\textbf{New bundled payment models:}
- AMI (Acute Myocardial Infarction)
- CABG (Coronary Artery Bypass Grafting)
- SHFFT (Surgical Hip/Femur Fracture Treatment)

Paid for overall performance. How do we measure this?
Clinical/Critical Pathways

Standardization of treatment is a tool used to measure performance.

3% reduction in ventilator acquired pneumonia doesn’t address value based care performance.

Instead implement standardized evidence-based VAP order sets proven to reduce inpatient mortality and increase delivery of important care.

Current treatment pathways include:
- Mechanical ventilation weaning
- Sedation
- Insulin therapy
- Sepsis
- Shock
- Stroke

Growing body of research, guidelines, higher patient acuity, and increased complexity of care demands higher-order skill set from nursing.
What’s my role?

Although physicians are responsible for directing and prescribing care for patients, nurses play a vital role in promoting adherence to practice guidelines.

Recognize changes in clinical presentation.

Provide meaningful nursing report and active communication.

Cultivate skills for clinical leadership.
Importance of Clinical Presentation
Importance of Clinical Presentation

BP 112/83, HR 103, RR 22, O2 99%

BP 87/60, HR 111, RR 24, O2 88%

BP 74/53, HR 124, RR 25, O2 75%
Importance of Clinical Presentation

Is clinical data more meaningful comparatively or alone?
Nursing Emphasis

- Expand focus from task-centered care (what is being done to the patient) to patient-centered care (what is going on with the patient).

- Back to the bedside.

- Standardize communication. What is to be communicated and how is the communication structured?

  S = Situation (a concise statement of the problem)
  B = Background (pertinent and brief information related to the situation)
  A = Assessment (analysis and considerations of options — what you found/think)
  R = Recommendation (action requested/recommended — what you want)
Case Presentation

► 47 y male sustained multiple gunshot wounds to face, abdomen and leg.

► VS BP 82/55, HR 107, RR 23, GCS 15 (normal), RTS 11 (urgent).

► Underwent emergency surgery and intubated.

► Exploratory laparotomy performed, pericardial window and drain placed, right thoracotomy and chest tube placed.

► Received 5 units PRC and 1 unit plasma.

► Stabilized, CT scan performed and sent to ICU.
**Hospital Course**

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Intubated and sedated. Oral gastric tube removed. Nasal gastric tube placement unsuccessful due to significant resistance and bleeding.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 2</td>
<td>Patient extubated.</td>
</tr>
<tr>
<td>Day 4</td>
<td>Required non-rebreather overnight to maintain oxygen saturation.</td>
</tr>
<tr>
<td>Day 5</td>
<td>Switched to nasal cannula, 6L oxygen. Patient complained of chest pain. STAT 12 lead performed, was unremarkable. HR 102-129. Pericardial drainage minimal and drain removed. Chest x-ray showed right pneumothorax and chest tube placed back on suction.</td>
</tr>
</tbody>
</table>
Hospital Course

Day 6  Taken to surgery for facial fractures. During induction patient became hypotensive. Intra-op ECG showed STE. Surgery deferred, patient transferred back to ICU intubated. Bedside echo showed hypokinesis. Cardiac cath performed to rule out MI. No evidence of coronary artery disease. Diagnosed with acute pericarditis. Placed on NSAIDS and colchicine (anti-inflammatory) for a week.

Day 7  Patient extubated.

Day 10 Patient transferred out of ICU to floor.

Day 12 Right chest tube removed. Facial fracture repair deferred indefinitely for increased risk of periorbital hematoma, since patient on high dose ibuprofen for acute pericarditis.

Day 14 ISS 34 (severe), TRISS 0.210, patient discharged home.
Discussion

Etiology of pericarditis was missed, creating:

1. Delay in patient care
2. Extended length of stay
3. Waste of limited resources

How does nursing care impact patient treatment?
Acute Pericarditis
Acute Pericarditis
Sudden injury or inflammation of pericardium

Causes:

- Systemic disease (infection, malignancy, autoimmune)
- Primary process (MI, trauma, dissection)
- Invasive procedure (pericardial drain)
Cardiac Tamponade

Signs & Symptoms

- SOB
- Hypotension
- PEA
- Beck’s Triad
- Pulses
- Paradoxus
- Kussmaul Sign
Pericarditis

Classic symptom: sharp, pleuritic chest pain.
Most specific sign: pleural friction rub.

Diagnostic criteria requires two of the following:
- Chest pain
- Pericardial friction rub
- ST segment elevation or PR depression
- New or worsening pericardial effusion

Assessment of patient symptoms (chest pain, pericardial friction rub) fall under scope of nursing (Nurse Practice Act).
Sites of Auscultation

- 2nd right interspace— aortic area
- 2nd left interspace— pulmonic area
- Apex— mitral area
- Lower left sternal border— tricuspid area
Heart Sounds

Normal

Pericarditis
Case Revisited

- Patient complained of chest pain on **Day 5**, HR 102-129.

- Unable to locate meaningful documentation of nursing or clinician auscultation.

- Literature recommends pericardial drain be removed as soon as possible due to pericardial irritation and discomfort. Pericardial drain placed **Day 1** and removed **Day 5**.

**Barriers:**

No practice standards or evidence based guidelines regarding management of pericardial drain removal or follow-up care.
Cardiac Monitoring
Musculature

Electrical System

Heart Systems

Heart is made up of a combination of cardiomyocytes responsible for muscle contraction and cardiac pacemaker cells responsible for electrical conduction.
Heart Conduction

Atrial depolarize

Atrial contracts

Atrial repolarize & ventricle depolarize

Ventricle contracts

Ventricular repolarize

Ventricle repolarization complete

Ventricle repolarization complete
PR & ST segment represent the interval between depolarization and repolarization.

ST elevation represents the heart’s inability to sufficiently prepare for the next cardiac cycle.

PR segment depression indicates atrial injury.
12 Lead vs Telemetry

- 12 Leads
- Considered diagnostic
- Snapshot - fixed time
- 10 second strip

- 5 Leads
- Hardwire – see 2 leads; bedside monitor ED, ICU
- Telemetry – see one lead; floors, allow ambulation
- Not considered diagnostic
- Continuous monitoring
- 6 second strip
Heart Regions

Colors represents distinct regions of the heart.

Reciprocal Leads
Acute Pericarditis vs. MI

Treatments for MI vs. acute pericarditis are very different.
Acute Pericarditis

Hallmark sign - diffuse ST elevation in all leads
Acute Pericarditis

Hallmark sign - diffuse ST elevation in all leads.
Case Revisited

12 lead ECG obtained on Day 5 at 8:26 when patient complained of chest pain.
Case Revisited

Day 5: Pericardial drain clamped, no fluid present.

13:51

Day 5: Pericardial drain pulled at 14:00.

14:00

18:00

19:19
Case Revisited

Day 6: Prior to surgery.

4:53

10:58
Case Revisited

12 lead ECG Day 6 in surgical suite
Case Revisited

No pattern that resembles particular region of the heart (reciprocal and contiguous leads).
Cardiac Monitoring Barriers

- Introduced 1960’s
- Lead to development of cardiac care units, telemetry floors, teleICU.
- Requires active management and human oversight.
- Paper charting vs. computer charting.
Alarm Fatigue

- AACN Alarm Practice Alert (2013) noted that 80%-99% of telemonitor alarms were false, non-actionable or clinically insignificant.
- Humans only capable of differentiating six different alarms.
- In ICU alarms increased from 6 (1983) to 40 (2011).
- PULSE study found that ICU’s under monitor for ischemia and over monitor for arrhythmias.
Case Revisited

- Unable to locate nursing or clinician documentation regarding tele strips assessment.
- ST alarm parameters in ICU turned off (default mode).
- Delay in recognition of pericarditis contributed to cancellation of facial fixation surgery.
- NSAID and colchicine treatment regime delayed facial fracture treatment.

**Barriers:**

Overuse and underutilization of cardiac monitoring, alarm fatigue, lack of updated AHA guidelines for cardiac monitoring practice standard in hospitals.
European Society of Cardiology
Pericarditis guidelines published 2004, updated 2015

Pericarditis diagnosis (2 of the following)
- Chest pain
- Pericardial friction rub
- ST segment elevation or PR depression
- New or worsening pericardial effusion

Laboratory testing (markers of inflammation, non specific to pericarditis)
- WBC
- Erythrocyte sedimentation rate
- C reactive protein levels
- CK-MB (with or without myocardial infarction)
- Troponin I (with or without myocardial infarction)
Proposed Recommendations

Standardize pericardial drain management in which pericarditis is actively monitored.

- Auscultation
- Tele strips 5th vital sign
- 12 lead ECG prior to removal of drain as baseline
- Labs
- Chest x-rays
- CT or CMR
Big Picture

Multidisciplinary nurse collaboration as a preemptive strategy -- not just when issues arise.
Take Away

- Point of care is the foundation of nursing excellence.

- Telemetry and 12 lead ECG monitoring is an important care guideline for trauma patients.

- Standard pericardial drain management is needed.

- Consider possibility of pericarditis for all trauma patients requiring pericardial drain placement.


References


