

SIMULATION CASE TITLE: Thoraco-abdominal stab wounds with pericardial tamponade

LEARNER AUDIENCE: Emergency medicine (EM) residents, EM attendings, Trauma residents, Physician Assistants, Trauma attendings, EM nursing

PATIENT NAME: Perry Slashing

PATIENT AGE: 23 year-old male

CHIEF COMPLAINT: Abdominal pain

PHYSICAL SETTING: Per EMS, 23 year-old male was found after being assaulted by multiple men. The patient endorses being punched and kicked multiple times and reports he may also have been hit with unknown objects.

Brief narrative description of case

23 year-old male with psychiatric history (on Seroquel) and alcohol abuse presents after altercation outside of bar. Per EMS, he was found after being assaulted by multiple men. Patient endorses being punched and kicked multiple times and reports he may have been hit with unknown objects. Patient denies head trauma or loss of consciousness (LOC), but endorses alcohol use. He is found to have a deep stab wound to the subxiphoid area and superficial wounds on his back. He is found to have a pericardial effusion. After completing primary and secondary survey, the team should discuss bedside drainage versus going to the operating room.

Primary Learning Objectives

Learning:

1. Perform ATLS - Complete primary survey, secondary survey, adjunct studies, and stabilizing interventions in an organized and timely fashion
2. Recognize and manage penetrating trauma
3. Recognize and treat pericardial effusion on the bedside echocardiography
4. Discuss indication for emergent pericardiocentesis versus thoracotomy
5. Use blood/Massive Transfusion Protocol (MTP) for hypotension

Communication:

1. Become familiar with team roles and responsibilities
2. Employ closed loop communication
3. Practice using shared mental model

Critical Actions

- ☐ Team members wear PPE
- ☐ Expose patient starting at the chest to allow for vitals and IV placement
- ☐ Place on monitor

	☐ Large bore IVs ☐ Perform primary survey ☐ Obtain chest x-ray, pelvis x-ray, and EFAST ☐ Perform secondary survey ☐ Identify and discuss management for traumatic pericardial effusion
Learner Preparation or Prework	<i>None</i>
Simulation Moulage and Equipment	<u>Moulage:</u> Fully clothed young male 2 cm deep laceration to subxiphoid region 2 cm superficial laceration to upper back (posterior) 1cm superficial laceration right flank (posterior) Abrasions to jaw <u>Equipment:</u> Manikin Patient monitor Simulated uncrossed pRBC products/ MTP bag No indication for C-collar

INITIAL PRESENTATION	
Initial vital signs	HR 101, BP 110/75, SpO2 97% RA, RR 20, T 98.4
Overall Setting and Appearance	Scenario: In trauma bay Patient on stretcher, fully clothed
Trauma Activation level	Level 1
Activation level justification	Stab to thoraco-abdominal area
Assigned sim team roles	1. EMS-gives team field information and vital signs 2. The Patient- all cases utilize a manikin, but someone needs to be the voice of the patient 3. Observer-ensure that team achieves critical actions, takes notes on team dynamics 4. Debriefers-leads post sim debrief on team communication, resuscitation logistics and medical management

EMS Report	Patient was drinking a few beers and got into an altercation outside a bar. He was only a little tachycardic for us, but otherwise stable. Only complaining of pain in his upper abdomen. Patient endorses being punched and kicked multiple times and may have been hit with unknown objects by multiple people.		
EMS vital signs	HR 110, BP 115/75, SpO2 97% RA		
Past Medical/Surgical History	Medications/Allergies	Social History	Last meal
PMH: unknown psych, Multiple broken bones- face, arm, ankle PSH: None	Meds: Seroquel All: None	Soc: + alcohol + meth +tobacco	6 beers at the bar this morning

Primary Survey	
Initial ED vital signs	HR 101, BP 110/75, SpO2 97% RA, RR 20, T 98.4
General	Normal, calm
Airway	Intact
Breathing	Equal bilateral breath sounds
Circulation	2 + distal pulses
Disability	GCS 15
Exposure	After exposure, 2 cm laceration to subxiphoid region, 2 cm laceration to upper back and right flank (posterior wounds are superficial)
EFAST	+ Pericardial effusion on subxiphoid view (video #10) All other views negative (video # 2,3,4,5)

Secondary Survey	
General	Normal
HEENT	PERLA, EOMI, abrasions to jaw
Neck	No cervical spine tenderness

Lungs	Equal bilateral breath sounds
Cardiovascular	Muffled heart sounds, + JVD
Abdomen	Tenderness in upper abdomen with stab wound to subxiphoid region, no crepitus
Pelvis/MSK	Stable pelvis, moving all extremities
Neurological	GCS 15
Skin	2 cm laceration to subxiphoid region, 2 cm laceration on the right flank, abrasion on the jaw
GU	Normal GU exam
Psychiatric	Calm

Imaging (see image bank)	
Chest X-ray	Negative (image #1)
Pelvis X-ray	Normal if ordered, although would not be indicated for this case (image #2)
EFAST	+ Pericardial effusion on subxiphoid view (video #10) All other views negative (video # 2,3,4,5)

INSTRUCTOR NOTES - CHANGES AND CASE BRANCH POINTS <i>This section should be a list with detailed description of each step than may happen during the case. If medications are given, what is the response? Do changes occur at certain time points? Should the nurse or other participant prompt the learners at given points? Should new actors or participants enter, and when? Are there specific things the patient will say or do at given times? There are a few examples given, but it is expected that most cases will have many more changes and potential branch points.</i>		
Intervention / Time point	Change in Case	Additional Information
BP worsens during primary survey	BP 95/63, HR 120, SpO2 98%, Nurse prompts to start doing EFAST exam if not already done	EFAST shows + pericardial effusion without tamponade
BP continues to worsen	BP 88/60, HR 130. Patient becomes confused with GCS 9	Team should consider MTP to address and support BP Change in GCS should prompt discussion for intubation, but team recognizes that intervention of choice is to address pericardial effusion

Pericardiocentesis versus Thoracotomy	In level 1 center, patient should go to OR	
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Ideal Scenario Flow

Learners enter the room to find a patient fully clothed. As the team walks into the room, roles should be assigned. Team leader and primary nurse should identify themselves clearly. All team members must wear PPE. As a team approaches the patient, nurse should be putting the patient on the monitor and getting vital signs as examining residents begin the primary survey. Two large bore IVs are placed. Team initiates the primary survey and calculates GCS 15. As the team completes the primary survey, a repeat set of vitals shows decreased BP and increased HR. The nurse notices this and brings it to the attention of the team leader and suggests to do an EFAST exam if not already done. EFAST reveals positive pericardial fluid in the subxiphoid view and negative LUQ, RUQ, suprapubic, and lung views. Team leader orders MTP.

Team discusses whether or not to go straight to the operating room or do a pericardiocentesis in ED. While they are discussing, another set of vital signs comes up on the screen with a worsening BP and HR. At this time, the patient also becomes confused. Team repeats primary survey, GCS now 9, and no new injuries are found. If EFAST is repeated, no new fluid is identified anywhere. Team should discuss intubation for confusion as well as discuss altered mental status in the setting of hypotension.

If at a level 1 trauma center, team should decide to go to the operating room for definitive management. If not at a level 1 trauma center, team should consider pericardiocentesis and initiate transfer. The case ends once this decision has been made.

Anticipated Management Mistakes

Possible management errors or difficulties that are commonly encountered when using this simulation case.

1. Failure to administer blood/initiate MTP early
2. Failure to discuss the management of pericardial effusion, such as pericardiocentesis or thoracotomy

Debrief Points		Additional Information
Communication	Closed loop communication	Don't ask the room for things, ask people, especially for critical actions.
	Shared mental model	Talk out loud so that everyone is on the same page.
	Role clarity	-Designate roles out loud, so everyone knows who is doing what.

		-Be sure to ask who the team leader is and who the primary nurse is. -When you arrive, introduce yourself. -Speak up if you do not feel you can complete the task asked of you.
Logistics	How to order MTP	Discuss the process at your institution.
	If this patient was not at a level 1 trauma center, how would you stabilize?	Depends on how far the closest trauma center is, drain alone versus drain and leave a catheter, etc.
Medical		
Penetrating chest trauma with pericardial effusion Indications for thoracotomy (EAST guidelines)	- Definitely yes: 1) Penetrating injury + arrest + previous signs of life OR 2) Blunt injury + arrest + previous signs of life - Relative yes: 1) penetrating injury + no signs of life AND CPR <15 min 2) blunt injury + signs of life in the field during transport and arrest <15min, 3) blunt injury with no signs of life, 4) multiple blunt trauma, 5) severe head injury - These indications also apply equally to children. - Physiologic status (I-IV) classified: no signs of life (I), PEA (II), profound shock (III), mild shock sbp 60-90 (IV)	https://coreem.net/podcast/episode-80-0/ https://lifeinthefastlane.com/penetrating-chest-trauma/ Other Resources: https://litfl.com/thoracic-trauma/ https://litfl.com/resuscitative-thoracotomy/ https://www.emrap.org/episode/stabbedwitha/stabbedinthe https://litfl.com/to-thoracotomy-or-not-to-thoracotomy/ https://emcrit.org/wp-content/uploads/2012/10/Seamon-2015-EAST-ED-Thoracotomy-Guideline-J-Trauma-Acute-Care-Surg.pdf (journal)
When to decide to perform pericardiocentesis?	Non-trauma centers where definitive surgical management is not immediately available and	

	transport time to a higher level of care facility	
Indications for MTP	ABC score versus shock index	
Intubation of unstable patient with pericardial fluid	Patients with acute pericardial effusions have labile hemodynamics and can decompensate with RSI. Intubation should be done in OR if possible.	