Stabbed in the Chest

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Take Home Points

- **Trauma resuscitations may benefit from the presence of a designated trauma team leader to direct logistics and resources.**
- **Crystalloid fluids promote coagulopathy and should be used judiciously. Use blood products if the patient is bleeding.**
- **Consider bullet trajectory in patients with gunshot wounds. X-rays may identify injuries in unexpected locations.**
- **Do a right side thoracostomy in patients receiving a left sided thoracotomy.**

- **EMS transports a patient after a gunshot wound to the chest with a blood pressure of 80/palp. The patient is awake and talking. What do you do?**

- **What is a trauma team leader?** It is similar to the leader of a code in cardiac arrest. The approach is hands off. The provider is 2-3 feet from the bed leading the resuscitation. The trauma team leader is in charge of the logistics and resources. In Canada, the trauma team leader may be a trauma surgeon, emergency physician, orthopaedic surgeon or anesthesiologist. A good trauma team leader has a particular skill set aside from their primary discipline.

- **If you are the lone physician treating a trauma patient, you will have to be organized, drive the resuscitation yourself and perform all the procedures.**

- **Mentally prepare for the arrival of the patient.** Discuss what you expect to see with the team based on the limited prehospital information. Discuss anticipated procedures and primary, secondary and tertiary options. What equipment do we need? Can we get IVs ready? Can we prime the Level One transfusers? Can we get a chest tube set up at the bedside?
    - "Ok, the patient has two penetrating injuries to his chest. He might have hemothorax, pneumothorax, cardiac injury, pericardial tamponade. He probably has an airway issue. What are we going to do if he loses pulses?" Delegate in advance who is going to do what.

- **How do you set up the room?**
    - Hicks has the ultrasound ready to go and the ultrasound probe in his hand. Is there a pericardial effusion?

    - If a hemothorax or pneumothorax is anticipated, the chest tube tray is opened up and ready to go.

- **The patient arrives and has an obvious open wound to the left side of the chest.** The patient is awake and conversant. The paramedic starts the report. **What are your first steps?**
    - **"Are there any immediate issues you need to tell me about such as shock, hypotension, airway or change in blood pressure during transport?"** If the answer is yes, get the patient on to the gurney as quickly as possible and start the primary survey.
    - **90% of the time there is no immediate life-threatening injury.** Take the time to hear the whole story from the paramedics.

- **Begin the primary survey.**
    - The patient is cursing. He will likely require airway intervention at some point but it doesn't have to be right now.
    - Put an ultrasound probe on the chest and look at the pericardium. You **need to know if there is fluid around the heart**. This influences everything; approach to airway, fluid resuscitation and whether or not you place a chest tube.
    - USS the lungs. Palpate the belly.
    - If someone has placed a collar on the patient, take it off. It has little benefit in penetrating trauma.

- **If you see fluid around the heart and the patient is hypotensive, what is your next step?**
    - **Say it out loud**. "There is a lot of fluid around the heart". The patient will need an ED thoracotomy if they lose pulses or ideally, a pericardial window performed in the OR.
    - **The patient may have other pathology such as a tension pneumothorax.** It is important to be systematic.

- **The ultrasound shows no lung sliding on the left. Do you place a chest tube or wait for the chest x-ray?**
    - You don't necessarily need either study to make this determination. If you have a hypotensive patient with a penetrating injury to the left side of the chest and decreased air, you need to decompress the left side of the chest. Perform a finger thoracostomy followed by a chest tube.

- **The trauma patient arrives with fluid hanging. Should you stop it?**
    - Between the prehospital setting and the emergency department, patients may receive 2-3 litres of crystalloid. ATLS has adjusted their recommendations to one litre of crystalloid followed by blood products. If you have blood products available and suspect the patient is bleeding, use blood products.
    - **Bringing the patient's blood pressure up to normal may be harmful.**
    - Crystalloids promote coagulopathy. **Coagulopathy in trauma may be due to multiple factors; early coagulopathy that is related to the nature of the injury and degree of shock as well as dilutional coagulopathy exacerbated by hypothermia and acidosis.**

- **Order blood before the patient arrives.**

- **When should you start tranexamic acid?** As soon as you think of it. We know it has a mortality benefit in bleeding trauma patients but this depends on time. The most robust benefit is within 3 hours. It may be harmful with later administration but this is controversial. Aim for administration within an hour.

- **Does management differ if the patient is shot versus stabbed in the chest?** If the patient is shot, you need to consider bullet trajectory. Unstable patients with gunshot wounds will go to the OR quickly without x-rays. However, imaging can make a difference in the stable patient with a gunshot wound. In one case, a patient was shot in the chest but work-up of the thorax was negative. X-rays showed the bullet had ricocheted off the vertebrae and travelled below the diaphragm where it caused injury to the IVC and serious intra-abdominal bleeding.
    - **Bullet mass; holes plus bullets have to equal an even number.** If it is not an even number, you are missing a bullet or you are missing a hole. If the math doesn't add up, you have to be systematic in your search for injury.

- **The patient loses pulses and needs a thoracotomy. You are the lone physician. What do you do?** You need to have a specific script for this procedure. We do not do these as frequently as trauma surgeons. If there is someone else available, have them decompress the right chest. If you go into the left chest, you don't know what is going on in the right chest. Do a finger thoracostomy on the right chest.
    - **Our primary role is to make the decision to open the chest.** Deliver the heart, do pericardectomy and examine for injuries. If there is an injury, repair it or stick a finger in it to achieve haemostasis. You can't tell if the patient has tamponade based on the visual inspection of the pericardium. Do internal compressions if indicated.
    - **If you work in a trauma centre or do this more frequently, you can consider going into the mediastinum and cross-clamping the aorta or doing a hilar twist to clamp bleeding pulmonary vessels.**
    - **This doesn't have to be complicated.**
    - The overall salvage rate is low (2-5%) but some patients such as with stab wounds and pericardial tamponade can have a survival rate of up to 30%.
    - **Have the respiratory therapist or other physician selectively intubate the right mainstem to deflate the left lung.** Drop an NG or OG tube to help identify the oesophagus. **Don't forget the right side. Perform a finger thoracostomy**. If you get blood, you will do a clamshell thoracotomy. Open the left side of the chest. Open the pericardium and deliver the heart.
    - **Cross-clamping the aorta is tricky.** You can do it with your finger and await back-up if available.

Why don't you do a pericardiocentesis? It is more difficult than thoracotomy. Clotted blood may make it less effective. However, if you are in a resource scarce environment and this is a procedure you are comfortable with, it may buy you some time.