Blood and Guts: Abdominal Trauma in football

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WHO AM I?

• Born in Israel, raised in Canada
• Graduated with MD and PhD in Physiology from University of Western Ontario, London, Canada in 1988
• 3 years of Neurosurgery training
• Another 3.5 years of Emergency Medicine Training
• Immigrated to US and West Hartford 1995
• Have worked as Emergency Physician at St. Francis Hospital since then with brief sojourn at Bristol Hospital from ‘99 to 2001
THEN

9/11
OATH

Commission

June 04, 2002

To Defend the Constitution
In Memory of Major John Pryor
WHO AM I?

- Deployed 3 times to combat zones over 5 years.
- Held Command position for 3 years
- Witnessed great suffering
- Horrific wounds
- Heroic Behavior
- Learned organizational and leadership skills
- Personal costs but also many gains
WHO AM I?

• After 24 years practicing medicine
• 16 of those here as ER MD and EMS Medical Director
• 10 years in the US Army
• Partnered with Yahel Gutman RN, veteran of the Israeli army, who also had 20 years experience many spent managing the ER and Bone Marrow transplant Unit at Tel Hashomer in Israel, the largest hospital in the Middle East
• We were both in a position to build an Urgent Care System that we envisioned would be unlike any a hospital or government corporation would or could build and manage.
Introduction

• Anatomy
• Pathophysiology
• Injury patterns
• Disposition
Anatomy

- Abdominal wall musculature
- RUQ - Liver
- LUQ - Spleen
- Epigastrium - Stomach, Duodenum, Pancreas
- Periumbilical - Small Intestines
- Suprapubic - Bladder
- Flanks - Descending/Ascending Colon, Kidneys
Anatomy

- Vital organs are well protected
- Abdominal wall musculature and expansile nature of peritoneal cavity and contents, dissipate energy
- Liver encapsulated organ, very vascular.
- Spleen encapsulated and also highly vascular
- Both under rib cage primarily
- Kidneys, retroperitoneal and posterior, Connected to Bladder via ureters
- Bladder mostly protected by pelvic bone except when very full
Physiology

- Four Classes or grades of hemorrhagic shock
- Encapsulated organs can bleed within the capsule and in a delayed fashion bleed again once the capsule is disrupted causing shock sometimes weeks later after injury
- Disrupted liver or spleen cause shock
- Young healthy athletes compensate until they suddenly don’t causing precipitous and sometimes irreversible deterioration
- Knowledge of anatomy and physiology essential to recognition of severe injury and predicting occult injury
Classification of Shock due to Trauma

<table>
<thead>
<tr>
<th>Class</th>
<th>Blood Loss</th>
<th>Response</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>&lt;15% (0.75 l)</td>
<td>Fast heart rate, normal blood pressure</td>
<td>None</td>
</tr>
<tr>
<td>II</td>
<td>15% - 30% (0.75 - 1.5 l)</td>
<td>Fast heart rate, low blood pressure</td>
<td>Intravenous fluids</td>
</tr>
<tr>
<td>III</td>
<td>30% - 40% (1.5 - 2 l)</td>
<td>Very fast heart rate, low blood pressure, confusion</td>
<td>Fluid and packed RBCs</td>
</tr>
<tr>
<td>IV</td>
<td>&gt;40% (&gt;2 l)</td>
<td>Critical blood pressure and heart rate</td>
<td>Aggressive interventions</td>
</tr>
</tbody>
</table>
Injury Recognition

- Medicine in all about pattern recognition
- The trainer must recognize what could cause death versus what can be sent back to play
- Serious injury is very uncommon
- In US, estimated death due to spleen/liver injury in football is 5-7/year
- Recognition of shock essential to rapid diagnosis and management
- Delay in treatment of shock may result in unstoppable spiral of organ injury and death
Injury Recognition - Minor

- Most common injury: solar plexus - temporary paralysis of diaphragm
- Should recover within 10-15 minutes
- Abdominal muscle wall strain also very common
- Pain is very localized, in lower quadrants and reproducible by contraction of abdominal muscle.
- Could have upper/superior abdominal muscle strain but clinically distinguishing this from liver/spleen injury far more difficult
Injury Recognition-Hepatosplenic

- Signs of shock, rapid pulse, diaphoresis if advanced altered mental status

- But an athlete coming off the field after exertion often is sweaty and tachycardic

- Pallor is a key

- Liver injury characterized by tender RUQ

- Spleen LUQ tender

- Splenic injury ask about history of sore throat, fatigue

- Mononucleosis can cause splenomegaly predisposing to rupture in contact sports
Injury Recognition - Hepatosplenic

- Both hepatic and splenic injury can be subcapsular or low grade
- Low grade hepatosplenic injuries may be tears which slowly ooze blood into peritoneal cavity
- Peritoneal blood causes diffuse abdominal pain and tenderness
- Rebound and guarding may be apparent but not immediately after contact trauma
Injury Recognition - Renal

- Renal injury very rare
- Pattern: flank trauma, tenderness and hematuria
- Shock from renal injury very rare
- Only gross hematuria worrisome, micro hematuria not clinically significant
- Bladder injury very unusual more typical in motorcycle accident with rider who had a few beers
- Most athletes empty their bladder prior to playing
Injury Recognition - Intestinal

- Intestinal injury in blunt trauma from contact sport almost unheard of
- Bowel perforation characterized by delayed presentation, hours after trauma, of abdominal tenderness and vomiting
- Very rarely traumatic intestinal herniation through abdominal muscle wall
- Hernia usually is in inguinal region
Disposition- Do they play or do they go

- Solar plexus usually recover and can return to play
- Abdominal muscle strain if ongoing pain and tenderness refer to outpatient clinic setting, end of play for that day
Disposition - Reasons to call 911

- Suspected hepatosplenic injury
- Signs and symptoms of shock
- Blood in urine, faeces or vomit
- Abdominal rigidity, guarding or persistent abdominal tenderness
- Worsening symptoms or objective signs
- If you are not sure
Conclusion

- Anatomy - Consider organs associated with the quadrants spleen/liver for upper and kidneys in flanks

- Physiology - Be mindful of the physiology of shock and that young athletes compensate until they don’t

- Injury Recognition is pattern recognition, learn them

- Disposition tender belly in upper quadrants or diffusely, abnormal vitals, blood in vomit, faeces or urine call 911