Cardiac and Pulmonary Issues in the Elite Athlete

Keep Your Edge
Hockey Sports Medicine 2015
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• Hockey related thoracic trauma is blunt
• Injury to the boney thoracic skeleton produce the physiologic derangements
• Injury may compromise the airway, breathing, or the circulation
• Diagnosis and treatment are based on the principles of the A.T.L.S. A.B.C.s
Unusual Causes of Airway Compromise

- Aspiration – gum, teeth, blood, vomitus, etc.  < Heimlich Hug>

- Sterno- Clavicular Dislocation

- Head Injury with L.O.C.
Sterno Clavicular Dislocations

• Sterno clavicular joint is the only articulation between the torso and the upper extremity

• Substantial ligamentous support

• Traumatic dislocation only after considerable force applied to shoulder

• Anterior dislocation more frequent than posterior
Sterno Clavicular Dislocations

• Anterior dislocation results from a lateral compressive force to the shoulder from the anterior position

• Clinical exam reveals a prominence of medial head of clavicle along with severe pain

• Reduction by traction applied to the arm in abduction and extension with direct anterior pressure on medial head of clavicle
Sterno Clavicular Dislocations

- Posterior dislocation results from a direct blow to the medial end of clavicle or a lateral compressive force applied to the shoulder from a posterior position.

- Palpable or visible hollow along lateral edge of sternum.

- Tracheal compression and injury to subclavian artery, vein or brachial plexus must ruled out.
Sterno Clavicular Dislocations

- Closed reduction frequently requires general anesthesia
- Lateral arm traction in abduction and extension
- Prepared for open reduction and ability to deal with associated vascular or neurologic injury
- Figure of eight support with sling
Thoracic Trauma in the Athlete

Sternal Injury

- Fracture with instability
- Commotio Cordis
- Painful limitation of respiration
- Associated spinal injury
Sternal Fractures

• Seen in 3% of blunt chest trauma
• Contact sports—football, hockey etc.
• Importance of associated injury to spine and C.N.S.
• Possibility of cardiac contusion and dysrhythmias
• Chest xray ultrasound and C.T. scan in diagnosis
Sternal Fractures
Treatment

• Associated injury take precedence
• Cardiac monitoring including tropins and echocardiography
• Pain control
• Role of surgical fixation
RIB FRACTURE-(Simple)

- Commonest thoracic injury in contact sports
- Associated intra-thoracic and intra-abdominal injuries
- Direct blow vs. compression of thorax
- Pleuritic pain restricts ventilation
- Crepitus and hemoptysis
RIB FRACTURES (COMPLEX)

- Pneumothorax Simple vs. Tension
- Hemothorax laceration of lung parenchyma or intercostal artery
- Fracture of ribs 9-12 rule out liver, spleen or renal injuries
- Fracture of ribs 1-3 rule out major vascular or neurologic injury
RIB FRACTURE-(COMPLEX)

Pneumo-Thorax

- Painful limitation to breathing
- Hyper-resonance on involved side
- Decreased air entry
- Subcutaneous emphysema
- Spectrum progressing to tension pneumothorax and circulatory collapse
Liberal Use of Illustrations
Hemo/Pneumo-Thorax Treatment

- Restore normal pleural dynamics
- At the arena - needle thoracentesis
- Supplemental oxygen by mask
- Tube thoracostomy to under water seal
Immediate Clinical Feedback

Needle Thoracostomy: What is the correct technique?

Choose the best answer

- Insert a 14 gauge needle (angiocath) in the 2nd intercostal space of the midclavicular line
  Correct!
- Insert a 22 gauge needle (angiocath) in the 2nd intercostal space of the midclavicular line
- Insert a 14 gauge needle (angiocath) in the anterior axillary line, inferior to the pectoral muscle
- Insert a 22 gauge needle in the (angiocath) in the anterior axillary line, inferior to the pectoral muscle
Blunt Abdominal Trauma
Organ Injury

- Splenic injury most common
- Liver
- Renal
- Pancreatic
- Diaphragmatic
Blunt Abdominal Trauma

- Immediate abdominal pain
- Hemodynamic instability
- Peritoneal signs
- A.T.L.S. principles
- Beware late developing abdominal pain
- Acute nontraumatic abdominal pain
- Rare gastro intestinal rupture
Physiologic Masking in the Elite Athlete

- Resting pulse below 50
- Adrenalin surge of competition
- Cardiac output six times normal
- Stroke volume and blood volume 50% above normal
- Volume loss through sweating
Sudden Death In Young Athletes Registry Data

- 27 year time frame 1990 to 2006
- 1866 deaths tabulated (85 cardiac arrest survivors)
- 1049 cardiovascular based 56%
- Hypertrophic cardiomyopathy in 36%
- Coronary artery anomalies in 17%
- Myocarditis in 6%
- Arrhythmogenic right ventricular myopathy in 4%
Trauma Related Cardiac Arhythmias

- Ventricular and supra ventricular extrasystoles
- Atrial fibrillation and flutter
- Supraventricular and ventricular paroxysmal tachycardia
- Ventricular fibrillation

- J.of Trauma May 2007 Ismailov R.M. et al
Commotio Cordis Registry 1999

- Age: 2-38  Mean= 12yrs
- C.P.R. – 75%
- Rhythmn restored – 16%
- Survivors 10%- 36% brain damaged
- No protective gear -84%
Commotio Cordis

- Blunt trauma to precordium in young athletes
- Baseball (67%), ice hockey (12%), Football (8%), lacrosse (5%)
- Sudden collapse following a chest blow
- Usually over precordial cardiac silhouette
- 15% survival rate
- Early resuscitation key determinant of survival
Commotio Cordis

- Low energy chest wall trauma-precordia
- Timing: -15-30 milliseconds before T-wave peak
- Arrhythmnia: - ventricular fibrillation
- Occurs in baseball/softball, ice hockey, lacrosse, football and karate
Commotio Cordis Treatment

- Immediate C.P.R. on scene
- Supplemental oxygen if available
- Early use of automated external defibrillator (A.E.D.)
- Rapid transfer to hospital care
Commotio Cordis Prevention

- Softer than standard or “safety baseballs”
- Improved sports specific chest protectors
- Wider prevalence of A.E.D.s
- Education of parents, teachers, and coaching staff in C.P.R. and use of A.E.D.s
CONCLUSIONS

- Serious injuries to chest and abdomen are blunt
- Rare but may be immediately life threatening
- Rule out hemo or pneumothorax
- Think of intra-abdominal bleeding with lower rib fractures
- Diagnosis and treatment based on A.T.L.S. ABCs
Commotio Cordis Treatment

- Immediate cardiopulmonary resuscitation
- Early application of automatic external defibrillator (A.E.D.)
- Supplementary oxygen
- Early evidence of improved survival