Penetrating Trauma Overview

DEFINITIONS

- Kinematics is defined as energy change.

- Accident is defined as event of chance or unknown.

- Collision results from carelessness. Thus we call a vehicle crash a “motor vehicle collision” not a “motor vehicle accident”

- Velocity is speed.

- Cavitation is such speed that body tissue is “knocked out of place”, “shattered”.

- Stared windshield – head hits glass.

THE NUMBERS

- Unexpected traumatic injuries are 140,000 deaths per year.

- Automobile account for 40,000 deaths per year.

- Penetrating trauma accounts for 40,000 deaths per year.

- Injuries by vehicle trauma totaled 3,125,000 per year.
THREE PHASES OF A CRASH

- 1st Car metal hits tree.
- 2nd Skeletal system hits car metal.
- 3rd Organs hit skeletal.
- 4th If unlucky person gets struck by flying items not secured.
- For testing in an MVC there is always a minimum of first three collisions. On a fall it may only be the first

NEWTON'S 3 LAWS

- Body at rest stays at rest, a body at motion stays in motion unless acted upon by outside force.
- Energy cannot be created nor destroyed, just changes form.
- For every reaction there is an equal and opposite reactions. (example, when a marble hits another the moving marble will recoil back once hitting the stationary marble).

KINETIC ENERGY

- Velocity versus weight.
- Speed will always do more damage than size.
- What does more damage a bus at 40MPH or a sports car at 90MPH? The answer is the sports car - always.
TWO TYPES OF TRAUMA

• Penetrating.

• Blunt – most common form of trauma.

MOTOR VEHICLE COLLISIONS

• Frontal – sudden deceleration.

• Rear impact – sudden acceleration – cause for whiplash.

• Lateral – most fatal– the body does not bend sideways.

• Rotations – clipped in corner and sent spinning.

• Rollover – most fatal if ejected or not restrained. If no visible signs of injury, must always suspect internal injury and should be evaluated.

• Note: Ejections almost always fetal.

PATHWAYS OF FRONTAL COLLISION

• Up and over – more head and chest trauma.

• Down and under – more leg, pelvis trauma.

AIRBAGS

• Hurt but better than hitting the car.
• Can cause facial fractures, abrasions, broken hands.

• Deploys at greater than 200MHP.

• Powder is not hazardous.

• If frontal impact and airbag not deployed be careful, it may go off at any time.

• If person is within 10 inches of airbag when deployed it is fatal.

PEDESTRIAN INJURY

• Kids face the car like a dear.

• Adults try to turn away.

• Kids likely to go down and under.

• Adults up and over.

FALLS

• Falls from 2 to 3 times the person height are considered dangerous. Most humans can fall out 2 and 3 story windows and live.

• Must consider on all falls; what part hit first, how hard was the surface they landed on, and how high.

• If head or feet hit first the spine is compressed. Axial compression’s.

BLAST INJURIES
• First wave is pressure/shock wave, Second wave is flying stuff, and third is when victim is thrown from blast.

• Eardrum rupture, lung damage from heat, eyes blood shot.

WEAPONS

• Low velocity weapons are hand held – ice pick, knife, fist.

• Medium velocity weapons are hand guns, shotguns, (tumble).

• High velocity weapons are hunting rifles (cavitations, shock wave).

GUN SHOT WOUNDS

• Exit is larger than entrance.

• Most gunshot wounds to chest do not bleed externally. All bleeding is internal.

• Bullets do not follow a straight line through the body in many cases. They are more likely to go straight through if only soft tissue is hit.