Cervical Spine Injuries

See also Neck trauma
See also Neck trauma (Peds)
See also C-spine clinical clearing

Background

1. General info
   - Most neck injuries are ligament sprains, muscle sprains, or contusions
   - Most athletic cervical spine injuries in US athletes occur in football players
   - In 1976 tackling and leading a hit with top of the helmet (spearing) was declared illegal
     - Incidence of spinal cord injuries in football players has greatly decreased since
   - Goals of acute care in cervical injuries:
     - Prevent further neurologic deterioration
     - Immobilize the spine
     - Safely transport the athlete to trauma center for definitive care if needed
   - Inter-Association Task Force for the Appropriate Care of the Spine Injured Athlete
     - http://www.nata.org/spineinjuredathlete/

Pathophysiology

1. Pathology of disease
   - Normal cervical lordosis helps dissipate axial loading though intervertebral disks, facet joints, interspinous ligaments, and paraspinal muscles
   - Axial loading with neck flexion seen in "spear tackling" (from tucking chin at impact) and diving, straightens or reverses lordosis
     - This is the primary mechanism in paralyzing sports related cervical spine injuries
   - NATA Guideline:
     - Head-Down Contact and Spearing in Contact Football
   - Acceleration/deceleration forces (whiplash injuries) cause injury to neck muscles, ligamentous supports, cervical facet joints
2. Incidence, prevalence
   - 10,000 cervical spinal cord injuries annually
   - Athletes account for 10%
   - Sports related injuries to the head and neck less common than extremity injuries
3. Risk factors
   - Greater risk sports:
     - Football, diving, rugby, surfing, skiing, boxing, hockey, wrestling, gymnastics, cheerleading
   - In football, defensive players are at greater risk
   - Incidence of a "burner" (peripheral neuropraxia) in football players is = 50%
4. Morbidity / mortality
   - Account for 70% of mortality and 20% of permanent disability due to sports injuries

Diagnostics

1. **Field care of the Non-Ambulatory athlete**
    - Neck pain in any downed athlete must initially be considered an unstable cervical spine injury
    - Prevention of further injury is most important
    - Do NOT remove the helmet, chin strap, or shoulder pads
        - Helmet and chin strap used for cervical spine immobilization
        - Shoulder pads help maintain cervical alignment
    - Helmets should not be removed in the field
    - Assess ABCDEs of trauma care
        - Establish airway, begin CPR as needed
        - The facemask should be removed with anvil pruners (used for gardening), a screwdriver, the TM extractor, or a Trainer's Angel
    - If athlete is face down use the log roll to move him/her onto spine board
        - Immobilize head with sand bags and tape
    - If respirations and pulse are present perform neurological exam
    - Remove the facemask from a helmet before transport
    - Transport to a hospital for definitive care
2. **Field Care of the Ambulatory athlete**
    - History
        - Always consider cervical spine injury in athlete with concussion or neck pain
            - Not uncommon for athletes with unstable fractures to walk off field
        - Assess for:
            - Neck, shoulder, arm and leg pain
            - Numbness, tingling, or weakness
            - Bowel or bladder dysfunction
            - Previous head or neck injuries
            - Apprehension about returning to play
        - If athlete answers "Yes" to any of the above:
            - Immobilize neck
            - Perform complete neuro exam
            - Consider transport to trauma center or emergency dept
        - Symptoms that localize to one arm usually indicate peripheral nerve injury
        - Symptoms that involve both arms or involve legs indicate spinal cord injury
        - Diagnosis of burner (peripheral nerve injury) ruled out by:
            - Bilateral upper extremity involvement
            - Any lower extremity involvement
            - Neck pain or tenderness
            - Consider more serious injury
    - Physical exam
        - Perform the following in order, if any positive findings present, STOP YOUR EXAM:
            1. Immobilize patient on spine board
            2. Transfer to a trauma center for definitive care

3. If suspect unstable fracture use spine board Rigid cervical collar alone not adequate for immobilization
4. Assess for LOC, evaluate ABCDEs
5. Check for normal cervical curvature, lacerations, bruising, obvious deformities
6. Assess peripheral strength and sensation. Do not move athlete's head or neck
7. Palpate neck for deformities or step-off, tenderness, spasm
8. Assess isometric neck strength without moving athlete
9. Assess active range of motion
10. Perform axial compression and the Spurling test
11. If negative, move athlete to sideline and evaluate for concussion

Immobilization and transport

Local protocols vary on when to immobilize athlete and transport versus watch and reevaluate

- If unclear, immobilize athlete and transport to emergency department

Indications for immobilization and transport:

- Post traumatic LOC
- Subjective neck pain
- Bony tenderness on exam
- Significant upper back/neck trauma
- Significant head injury, mental status changes, neurologic abnormalities
- Significant mechanism of injury

Diagnostic imaging

Radiographs

AP, lateral, and open mouth views

CT-increased ability to identify hairline fractures, spinal canal stenosis

CT is becoming the preferred cervical spine imaging modality at many centers

MRI used to evaluate for ligamentous disruption, herniated nucleus pulposus, spinal cord contusions

Differential Diagnosis

1. Burner/stinger (peripheral nerve injury)
2. Cervical muscle or ligament sprain (whiplash injury)
3. Intervertebral disk injury and spinal cord syndromes
4. Fracture/dislocation with or without neurologic deficit
5. Facet arthropathy
6. Medical causes of neck pain:
    - MI, thyroid, pulmonary, infectious

Therapeutics

1. Acute treatment
    - See Field Care of the Non-Ambulatory Athlete
    - Assess for airway compromise
    - Assess for neurological deficits and other injuries
    - Immobilize

- Transport to capable facility
  - Call ahead to ensure spine care coverage

2. Further management (24 hrs)
   - Varies with final diagnosis
   - Watch for new or persistent neurologic complaints
3. Long-term care
   - May include:
     - Observation, physical therapy, spinal decompression, spinal fusion depending on injury pattern
   - Watch for new or persistent neurologic complaints

Return to Play Guidelines

1. May return to play if:
   - Full and pain free range of motion
   - Normal neurologic exam without numbness, tingling, dysesthesias, weakness, or pain (even with axial compression and Spurling's test)
   - No spinal column injury (bony or ligamentous)
2. Absolute contraindications to participation in collision or high risk sports:
   - Spear tackler's spine
     - Developmental cervical canal stenosis
     - Reversal of normal cervical lordosis on lateral radiographs
       - Preexisting posttraumatic radiographic abnormalities of cervical spine
     - Documentation of athlete having used spear tackling technique
   - Residual pain or limited range of motion
   - Acute fracture or herniated nucleus pulposus
   - Recurrent cervical cord neuropraxia
   - Fracture or ligament laxity at C1-C2
   - Acute or chronic hard disk
   - C1-C2 fusion
   - Vertebral body instability >3.5 mm or 11°
   - Vertebral body fracture with sagittal compression, arch fracture, ligament injury, or fragmentation at the canal
   - Lateral mass fracture with facet incongruity
   - >3 level fusion

Prevention

1. Teach safe tackling technique
   - Safe Tackle Video-Tulane Sports Medicine Institute
     - http://www.som.tulane.edu/departments/orthopaedics/safe_tackle/quicktime.html
2. Ensure proper conditioning and skill level before engaging in full contact activities

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