

# CERVICAL SPINE INJURIES IN ATHLETES

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## CERVICAL SPINE INJURIES

Today's talk:

- Review types of cervical injuries
- Discuss pathomechanics, esp related FB
- Discuss C-spine x-ray interpretation
- CCN
- Cervical spinal stenosis
- Stingers
- Spear Tackler's spine
- Common management decisions
- Emergency management
- Return to play

## CERVICAL SPINE INJURIES IN ATHLETES

- **1.4 million football players (HS and college)**
- **15% of players suffer C-spine injuries**
- **Overwhelming majority self-limited**
- **1977-1989: 128 players suffered permanent spinal cord injury (about 10 per year)**
  - **NCAA study, Spinal Disorders 1990;3:227**
- **50% college players with history of neck injury showed xray changes**
  - **Jama 1976;236:1243**

## CERVICAL SPINE INJURIES IN ATHLETES

- **Cervical myofascial strain**
- **Cervical sprain - stable & unstable**
- **Cervical fractures**
  - ◆ **Stable**

- ◆ **Unstable with/without neurologic deficit**

## **CERVICAL SPINE INJURIES IN ATHLETES**

- **Intervertebral disk injury**
  - ◆ **With/without neurologic deficit**
- **Subluxation/Dislocations**
  - ◆ **With/without neurologic deficit**
- **Facet Syndrome**
- **Spear Tacklers Spine**

## **CERVICAL SPINE INJURIES IN ATHLETES**

- **Transient Quadriplegia**
  - **Neuropraxia of the cervical cord (CCN)**
- **Burning hands syndrome (variant of CCN)**
  - **Edema and vascular insuff. within the Spinothalam. Tracts**
  - **Glove distribution**
- **Stingers / Burners**
  - **Nerve root injury**
  - **Brachial plexopathy**

## **PATHOMECHANICS OF ATHLETIC INJURY**

- **AXIAL LOADING WITH CERVICAL FLEXION (30 DEGREES)**
  - ◆ **Poor energy absorption**
  - ◆ **Excessive forces result in segmental buckling, fracture or dislocation**

# **PATHOMECHANICS OF SEVERE CERVICAL INJURY**

## **➤ PERMANENT CERVICAL QUADRIPLEGIA**

- ◆ **Spearing - 52%**
- ◆ **Other axial loading - 35%**
- ◆ **Hyperflexion - 10%**
- ◆ **Hyperextension - 3%**

*Football 1971-1975*

## **CERVICAL SPINE RADIOGRAPHY**

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### **➤ FLEXION / EXTENSION VIEWS**

- ◆ **Localize ligamentous disruption**
- ◆ **Vertebrae may slide up to 2mm anteriorly**
- ◆ **Change in interspinous distance, disk/facet heights**

## **CERVICAL SPINAL CORD NEUROPRAXIA**

- ◆ **Follows C-spine trauma**
- ◆ **Transient paresis**
- ◆ **Always bilateral UE, LE or both**
- ◆ **X-rays negative for acute changes**
- ◆ **Cervical spinal stenosis with or without congenital fusions, ligament instability, disk disease**

## **CERVICAL SPINAL CORD NEUROPRAXIA**

- **Complete recovery generally 10-15 minutes; up to 48hrs**
- **Conscious, no neck pain**

- Does not necessarily predispose an athlete to permanent neurological injury
- Management: Rule out significant risk factors; individual athlete counseling

## **CERVICAL SPINAL STENOSIS**

- CONGENITAL OR ACQUIRED (SPONDYLOSIS)
- ‘Normal’ canal diameter on lateral xray: 14-23mm
- Torg (Pavlov) Ratio less than 0.8: developmentally narrow
- Lower ratios in professional/elite college players d/t larger vertebral bodies
- M.R.I. and C.T. Myelography preferred.

## **“STINGERS AND BURNERS”**

### ➤ BRACHIAL PLEXUS VS. NERVE ROOTS

- ◆ Unilateral shoulder, arm paresthesias, pain and weakness
- ◆ Most last seconds to minutes
- ◆ Some cause permanent neurological injury
- ◆ C5 and C6 most common
- ◆ Biceps, deltoid and spinatus muscles
- ◆ Up to 50% of football players (JAMA '79;241:1480)

## **“STINGERS AND BURNERS”**

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### ➤ UNIVERSITY OF IOWA 1987 – 1991

- ◆ 85% root compression - 50% Torg ratio less than 0.8 @ one or more levels
- ◆ 15% brachial plexus traction - unassociated with Torg ratio
- ◆ Torg ratio less than 0.8 = 3X risk of stingers
  - ◆ (Meyer SA et al, Cervical spinal stenosis and stingers in collegiate football. AmJ Sports Med 1994; 22:158)
- ◆ Torg ratio not recommended for screening.

## **“STINGERS AND BURNERS”**

- **RETURN TO PLAY**
- ◆ **Full cervical range of motion**
- ◆ **Full UE strength**
- ◆ **Absence of neurological symptoms**
- ◆ **Normal Radiologically**
- ◆ **Protective gear (neck roll and padding)**
- ◆ **Education re: injury, prognosis**

## **TRAUMATIC NEUROPATHY**

- **Neuropraxia (Gr I) demyelination/conduction block - heals in 1-2 weeks**
- **Axonotmesis (Gr II) loss or disruption of axon and myelon sheath, epineurium intact - heals in months with possible permanent features**
- **Neurotmesis (Gr III) disruption of endo, peri and epineurium - permanent neurologic deficit**

## **SPEAR TACKLER’S SPINE**

### **COMMON MANAGEMENT DECISIONS**

- **NECK PAIN FOLLOWING TRAUMA**
  - ◆ **Conscious**
  - ◆ **Ambulatory / Stretcher and Immobilization**
  - ◆ **Neurologic involvement**
  - ◆ **Return to play vs observe / further w/u**

### **COMMON MANAGEMENT DECISIONS**

- **FINDINGS THAT PRECLUDE PARTICIPATION:**
  - ◆ **Torticollis (wryneck) posture**

- ◆ Painful cervical motion
- ◆ Impaired cervical range of motion
- ◆ Persistent paresthesias / pain
- ◆ Persistent weakness

## **EMERGENCY MANAGEMENT: UNCONSCIOUS OR SPINE INJURED**

### **➤ Have a “game plan”**

- ◆ Proper equipment
- ◆ Proper training
- ◆ Means of transport

## **EMERGENCY MANAGEMENT: UNCONSCIOUS OR SPINE INJURED**

### **➤ PROPER EQUIPMENT**

- ◆ Spine board
- ◆ Bolt cutters, screw driver, Trainer’s Angel
- ◆ Telephone
- ◆ Oxygen
- ◆ Rigid cervical collar

## **EMERGENCY MANAGEMENT: UNCONSCIOUS OR SPINE INJURED**

### **➤ PREVENT FURTHER INJURY**

- ◆ Immobilize and stabilize
- ◆ Do not immediately remove head gear
- ◆ ABC
- ◆ Neurologic evaluation
- ◆ Move patient only to transport or perform CPR

## **EMERGENCY MANAGEMENT: SPINAL CORD INJURY**

➤ **I.V. USE OF METHYLPREDNISILONE WITHIN 8 HOURS**

- ◆ **Initial dose 30mg/kg bolus over 15 minutes**
- ◆ **Maintenance - 5.4 mg/kg/hour over next 23 hours**

Source: National Institute of Neurological Disorders and Stroke

**CERVICAL SPINE INJURIES: RETURN TO PLAY**

- **Individual, medical decision**
- **Guidelines present, but no consensus**
  - **Cantu RC et al. Clinics in Sports Med. 1/98, V17,n1**
  - **Morganti C et al. Spine 2001,v26,n10,1131**
  - **Torg JS et al. Criteria for return to contact activities following cervical spine injury. Clin J Sports Med 1991;1;12-26**

**RETURN TO PLAY:**

**TORG'S CRITERIA (clin j sports med. 1991)**

➤ **NO CONTRAINDICATION**

- **Spina bifida occulta**
- **Type 2 Klippel-Feil, C3 and below (without abnl findings)**
- **Pavlov ratio < .8**
- **Nondisplaced stable healed fracture at compression or endplate, no posterior involvement; or clay shoveler's fracture**
- **Healed HNP**
- **One level fusion**

**RETURN TO PLAY: TORG**

➤ **RELATIVE CONTRAINDICATION**

- **Pavlov <.8 with motor or sensory neurapraxia**
- **Previous episodes of neurapraxia**
- **Two or three level fusions**
- **Healed but displaced stable fx's C3-7 at posterior ring, compression fx**
- **Healed, nondisplaced stable fx C1-2**
- **Instability < 3.5 mm/11° on lateral xray**
- **Healed HNP with residual facet instability**

## **RETURN TO PLAY: TORG**

### **➤ ABSOLUTE CONTRAINDICATION**

- **Odontoid agenesis**
- **Odontoid hypoplasia**
- **Os odontoidium**
- **C1-2 anomaly or fusion**
- **Type 1 Klippel-Feil anomaly**
- **Type 2 Klippel-Feil a/w instability, reduced ROM or DJD**
- **Spear Tackler's spine**
- **Residual pain or limited range of motion**

## **RETURN TO PLAY: TORG**

### **➤ ABSOLUTE CONTRAINDICATION, cont'd**

- **Instability**
- **Acute fracture or central HNP**
- **Cervical cord neurapraxia a/w instability, DDD, cord defect on MRI, sxs > 36hrs, or >1 occurrence**
- **Fx or ligamentous laxity at C1-2**
- **Acute or chronic hard disc with s/sx's**
- **Instability > 3.5mm/ 11°**
- **Body fx with compression, arch fx, ligament injury**
- **Lateral mass fx with facet incongruity**
- **> 3 level fusion**

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