Sports Osteopathy

March 2015 AAO Convocation
Student Program
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Case 7

- 25 year old soccer (football) player collides with another player and falls to the ground striking her head.
- Develops severe neck pain radiating into her left arm. Patient also complains of some numbness of her fingertips and her left hand. She also cannot look to her left.
Case 7 – Soccer player

- On physical exam:
  - Positive Spurling’s sign
  - Decreased biceps and brachioradialis reflex on Left
  - Poor cervical range of motion
  - Palpable splinting of neck muscles
  - Unable to extend neck without severe pain
  - Of note, pt hx includes known group curve convex right T3-T7; tenderness along rib angles of rib 3-7; sacral base lower on L; short leg L
Case 7 – Soccer Player

- Imaging
  - Cervical spine:
    - Reversal of lordosis
    - The typical radiographic findings include loss of the normal lordotic curve by the straightened cervical spine (78% cases), anterior and posterior subluxation on flexion and extension views, narrowing of IVD spaces at C4–C6 in 46% of cases, discopathy at the affected vertebral level as the injury progresses, and osteoarthritic changes that are often accompanied by foraminal spurring.
    - No fractures

- Head CT
  - Negative for intracranial bleed.
Considerations

- Acute Cervical Radiculitis
- Brachial Plexopathy – ‘Burner/Stinger’
- Parsonage-Turner Syndrome
- Thoracic Outlet Syndrome
- Compensatory Cervical Lateral Curve
- Spear Tackler’s Spine
Acute Cervical Radiculitis

- Localized pain to a distribution of one or more nerve roots without evidence of spinal cord dysfunction
- Signs:
  - Segmental weakness and abnormal DTRs in the arm
    - Deltoid weakness, scapular winging, weakness of intrinsic muscles of the hand (Grade B)
- Symptoms
  - Arm pain, neck pain, scapular or peri-scapular pain, chest or deep breast pain, headaches
  - Root lesions cause paresthesia, dysesthesia, and numbness in a dermatomal distribution
- Exacerbated by:
  - Cough, sneeze, increased intra-spinal pressure
  - Passive neck flexion
Acute Cervical Radiculitis

- Tests
  - Spurling’s, shoulder abduction (Grade C)
  - CT, CT myelography, MRI
    - Before Surgical decompression (Grade B)
  - Electromyography is unclear after MRI and Clinical Exam

- Outcome measure
  - Neck Disability Index, Short form 36 and 12, and the Visual analog scale (Grade A)
Brachial Plexopathy

- Neuralgic amyotrophy
  - Severe pain in the shoulder
  - Within several days
    - Weakness, reflex changes, sensory disturbances in the arm C5, C6
- Unilateral
  - May be bilateral
  - Wasting may be profound, motor deficit corresponds to axillary, suprascapular, radial nerve
- Cause
  - Unknown; injury, injections, inoculations, minor systemic infections
  - Familial; autosomal dominant 17q25
  - Neoplastic infiltration
  - Radiation therapy
  - Median sternotomy
  - Trauma
  - Electrical injury
- Diagnosis
  - Electromyography
    - If negative consider: conversion reaction, malingering, thoracic outlet syndrome
Parsonage-Turner Syndrome

- Also known as
  - Acute Brachial Neuropathy
  - Neuralgic amyotrophy
  - Brachial plexitis
  - Brachial neuritis
- Age 20-65, males slightly more
  - Lesion of peripheral nerves and upper arm
- Progression:
  - Deep ache of deltoid; almost muscle strain
  - Abrupt severe, intense pain with burning
  - Can awaken patient from sleep
  - Movement aggravates, narcotics improve
  - Several days later, weakness then sensory and reflex impairment
  - Pain subsides, total paralysis of the muscle
  - Recovery at 6-12 weeks
Thoracic Outlet Syndrome

- Compression syndrome of the neurovascular structures in the upper extremity
- Brachial plexus, subclavian artery/vein, axillary artery
- Three compression areas
  - Anterior and middle scalene muscles (Scalene anticus)
  - Cervical Rib
  - Clavicle and first rib (Costoclavicular)
  - Neurovascular compression
- Symptoms:
  - Pain, numbness, weakness, swelling of upper extremity esp. ulnar border
  - Radiation to the neck or down the arm
  - Paresthesia’s to fourth and fifth digits
  - Numbness at night or overuse
  - Pallor of the elevated extremity, sensitivity to cold
Thoracic Outlet Syndrome

- **Signs:**
  - Weakness and atrophy hand muscles esp. muscles innervated by lower trunk of brachial plexus and ulnar nerve
  - Positive Adson’s Test
  - DTR intact
  - EMG studies with reduced ulnar sensory potentials
  - Chest and cervical spine plain x-rays are the only imaging needed; to rule out intra-thoracic pathology, cervical spine pathology, first rib and clavicular abnormalities and cervical ribs.

- **Treatment**
  - Conservative: heat, analgesics, exercise program

- **Recovery:** 2-3 weeks
TOS Tests

- East test, Hands up Test, Roos Test
  - Arms up at 90 degrees with 90 degrees External rotation, open and close hands
- Adson Test
  - Head extended, sidebent, rotated toward, arm extended
- Costoclavicular maneuver
  - Depress shoulder, extend GHJ elbow locked
- Allen test
  - Abduct, extend, externally rotate shoulder, look away
- Provocative Elevation Test
  - Already have symptoms, relieves them
  - Arms crossed over chest
TOS

- The Triad of Signs consists of the following:
  - Weakness of abduction and adduction of the 5th finger, and weakness of the pinch strength between the thumb and 5th finger as compared with the pinch strength between the thumb and the index finger.
  - Tiredness and/or paresthesia’s, numbness of the upper extremity and hand on elevation; associated or not with paleness of the hand.
  - Tenderness on thumb pressure over the ipsilateral supraclavicular area, lateral to the sternocleidomastoid muscle just above the clavicle. The patient’s nonverbal response, particularly facial grimaces and withdrawal should be observed.
  - A simple objective test to assess the positional vascular obstruction at the thoracic outlet is the observation of the change of colors of the hands when the patient elevates the hands above the shoulder girdle, with the fingers pointed to the ceiling and the palms facing the observer. The appearance of the paleness, sometimes cadaveric, in one or both hands is called the White Hand Sign.
Thoracic Outlet Syndrome: Cervical Rib

- C8-T1 nerve root compression by a rib/band from the 7th cervical vertebra
- Weakness and wasting of intrinsic hand muscles
  - Thenar eminence
- Pain, numbness in dermatomal distribution
- Subclavian artery compression
  - Positive Adson’s Test
  - Supraclavicular bruit during the Adson’s test
- Diagnosis
  - X-rays
  - Electromyography: decreased ulnar sensory nerve AP
Compensatory Cervical Lateral Curve

- Result of existing thoracic scoliosis
- Leading to worsening of postural imbalances
Postural Imbalance

- Postural balance = optimal distribution of body mass in relation to gravity

- Postural imbalance = ideal distribution of body mass is not achieved (scoliotic curves can produce this imbalance)

- Structural asymmetry → anatomic landmarks higher on side of convexity (ex. Acromion higher on R in pt with dextroscoliosis in thoracic’s)

- Paravertebral humping on convex side

- Stretched muscles and rib deformation on convex side

- Sacral base un-leveling (ex. L Anterior sacrum with thoracic dextroscoliosis) and short leg syndrome (short leg same side as anterior sacrum)
Diagnostic & Treatment Sequence

- Attention to existing thoracic scoliosis: T3-T7 convex right
- Cranial – indirect
- “Woe is me” position
  - Thoracic Inlet – indirect
  - First Rib
  - Cervical Spine
  - Coracoid – Pectoral Minor insertion
Scoliosis: Plan of Attack

- **Step One:**
  - Level the sacral base
  - Upper Lumbar
  - Psoas
  - Sacrum

- **Step Two:**
  - Decrease facilitation & Release pain generators
  - Upper thoracic’s and ribs
  - Infraspinatus, Subscapularis, Pec minor, Biceps
  - Scapulothoracic joint
Lumbar

Diagnosis

Treatment
Psoas

Diagnosis

Treatment
Sacrum Treatment

Diagnosis

Treatment
Group Curve

**Diagnosis**

Restricted right sidebending (sidebent left, and rotated right)

**Treatment**
Scapulothoracic joint

**Diagnosis**

The concave side has tight erectors

**Treatment**

You can put a pillow under the group curve
Upper Thoracics

**Diagnosis**

**Treatment**
Infraspinatus

Diagnosis

Treatment
Subscapularis

**Diagnosis**

**Treatment**
Long Head Biceps

**Diagnosis**

**Treatment**
Cranial base and temporal’s

Diagnosis

Treatment
Upper Ribs

**Diagnosis**

**Treatment**
Cervical Spine: Indirect

Diagnosis

Treatment
Thoracic Inlet

Diagnosis

Treatment
Pectoralis Minor

Diagnosis

Treatment
Pronator teres

Diagnosis

Treatment
Janda / Greenman Rehabilitation

- 5 tests
- Neck flexion
- Shoulder Abduction
- Scapular Retraction (Quadriped)
- Push-up
- Scapular Depression
Firing Patterns: Shoulder Abduction

Normal firing Patterns

1. supraspinatus
2. deltoid
3. infraspinatus
4. mid and lower trapezius
5. contralateral quadratus lumborum
6. Common variation:
   a) levator scapulae
   b) upper trapezius
   c) early firing of quadratus lumborum
Janda & Greenman Rehabilitation: Neck Flexion

- Importance of first 10 degrees
- Usually strong SCM and tight or weak scalene.
- Motion occurs:
  - CO-1-2
  - C4-5
  - T4
- C5 has most sympathetic nuclei
- Type A: Has apex of lordosis at C4
- Type B: Has apex of lordosis at C5 – over stresses C5.
- Weak deep neck flexors, causes the SCM and Scalenes to compensate (3)
Scapular Stabilization

Excessive winging of the medial borer of the scapula occurs because of weakness and lack of stabilization by the lower trapezius and serratus anterior and rhomboids.
Push-up

Excessive winging of the medial borer of the scapula occurs because of weakness and lack of stabilization by the lower trapezius and serratus anterior and rhomboids.
Scapular depression

- The patient is asked to push the inferior angle of the scapula inferiorly and medially, against resistance.
Tight Muscles

Postural muscles (become tight with segmental facilitation)

- Levator scapulae
- Upper trapezius
- Pec. major
- SCM
- Biceps brachii (flexors)
- Erector spinae (cervical and lumbar regions)
- Quadratus lumborum
- Scalenes
Levator Scapulae
Upper Trapezius
Pec. Major

Arm high

Arm Middle

Arm Low
SCM
Biceps Brachii (Flexors)
Scalenes

(5.37) Anterior/lateral view of scalenes
Weak Muscles

- Mid-Lower Trapezius
- Serratus anterior
- Supraspinatus
- Infraspinatus
- Deep neck flexors
- Deltoid
- Triceps
Middle and Lower Trapezius
Serratus Anterior

Muscle fibers underneath the scapula

(2.82) Lateral view of serratus anterior
Rhomboids
Supraspinatus
Infraspinatus
Deltoid

YOU CALL THAT A DELTOID???

Deltoïd

Posterior

Anterior

Middle

Lateral view of deltoid showing the three segments

1

2
Deep Neck Flexors

Longus Capitis

Longus Colli
This is how Norwegians strengthen their triceps!
Summary

Cervical radiculopathy


- Approximately 10,000 severe cervical spine (neck) injuries occur annually in the United States, with about 1,000 of these injuries resulting from sport-related events.
- Many Winter Olympic sporting events have an increased risk of cervical spine injury because of the speed at which the athlete travels and the potential for contact with other athletes or the surrounding terrain.
- High-velocity events, such as downhill skiing, ski jumping, and toboggan racing, carry a greater risk for cervical spine injury than lower-velocity events, such as ice hockey, figure skating, or curling.
- Athletes with signs and symptoms of cervical radiculopathy (sensory or motor abnormality), such as numbness or weakness of a limb, are closely monitored by their athletic trainer and physician. Improvement usually occurs within 2 to 3 months in 65% to 70% of patients with cervical radiculopathy.

Brachial Plexopathy

Brachial Plexus Injury in Sports Medicine : Medscape

Author: Thomas H Trojan, MD; Chief Editor: Sherwin SW Ho, MD

- The result of trauma to the brachial plexus can lead to the cervical "stinger" or "burner" syndrome, which is classically characterized by unilateral weakness and a burning sensation that radiates down an upper extremity. The condition may last less than a minute or as long as 2 weeks, with the latter duration described as a chronic burner syndrome.
- 50% of all college football players have had burners and approximately 85% tend to reoccur.
- The following 3 mechanisms are common to brachial plexus injury:
  - Traction caused by lateral flexion of the neck away from the involved side (similar to the mechanism in birth trauma)
  - Direct impact to the Erb point causing compression to the brachial plexus (often associated with poor-fitting shoulder pads)
  - Nerve compression caused by neck hyperextension and ipsilateral rotation (The neural foramen narrows in this mechanism.)
Summary

Parsonage Turner Syndrome

- Acute onset of severe shoulder pain followed shortly thereafter by weakness of at least one shoulder muscle—it is often confused clinically with more well-known disorders such as cervical spondylosis, rotator cuff tear, shoulder impingement syndrome, and acute calcific tendonitis
- The MR finding most typical of PTS is that of diffuse high signal intensity involving one or more muscles innervated by the brachial plexus depicted on T2-weighted images. T1-weighted MR images also may show atrophy of the affected muscle(s). The pattern of muscular involvement should match the distribution(s) of one or more peripheral nerves originating from the brachial plexus
- On physical exam: once pain stops, paralysis starts: severe weakness of the external rotators and abductors
- 75% complete recovery in 2 years.

Thoracic Outlet Syndrome

- Compression occurs when the size and shape of the thoracic outlet is altered. The outlet can be altered by exercise, trauma, pregnancy, a congenital anomaly, an exostosis, postural weakness or changes. Below is a list of the component syndromes which comprise thoracic outlet syndrome along with a brief description of each. Refer to the scheme for questions about the gross anatomy of the region.
  - **Anterior scalene tightness** Compression of the interscalene space between the anterior and middle scalene muscles—probably from nerve root irritation, spondylosis or facet joint inflammation leading to muscle spasm.
  - **Costoclavicular approximation** Compression in the space between the clavicle, the first rib and the muscular and ligamentous structures in the area—probably from postural deficiencies or carrying heavy objects.
  - **Pectoralis minor tightness** Compression beneath the tendon of the pectoralis minor under the coracoid process—may result from repetitive movements of the arms above the head (shoulder elevation and hyperabduction).

Kolev, I. Parsonage-Turner Syndrome, Orphanet Encyclopedia, 2004
References