



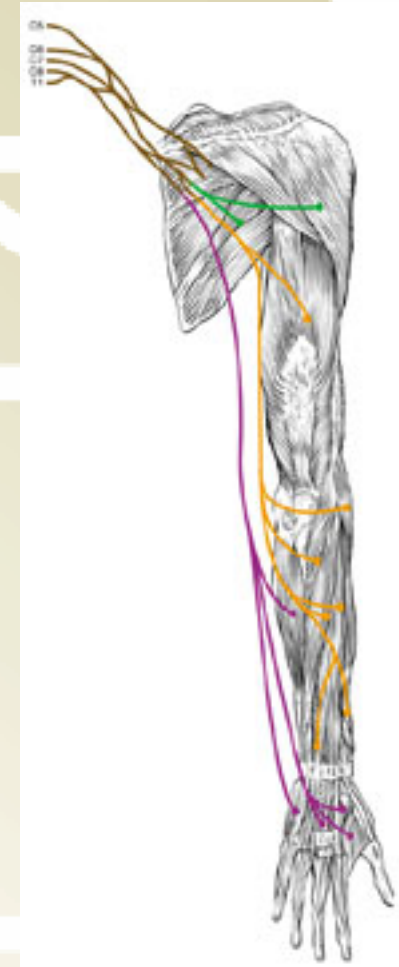
Brachial Plexopathy in a Division I Football Player



www.fisiokinesiterapia.biz

Brachial Plexus Injuries in Sport

- Typically a transient neurapraxia - 70% of injured players said they did not always report their burners
- Injuries recurs in approximately 57% of athletes





Background

- UVA at South Carolina; Sept. 2003
- 19 year old safety - open field tackle leading with his left shoulder
- No previous neck injury or “stingers”

Injury:

QuickTime™ and a
Video decompressor
are needed to see this picture.





On Field Presentation:

- No LOC
- Left arm numb and immobile
- Rapidly developed motor function in hand, and wrist
- Painful paresthesia in entire left UE
- No visible contraction was palpated in the shoulder or biceps

A stylized graphic of a stadium in shades of olive green and tan. It features a semi-circular roof at the top, a triangular pediment in the middle, and several vertical columns below. Small white stars are scattered throughout the lower portion of the graphic.

Differential Diagnosis: on field

- Stinger
- Shoulder dislocation
- Humeral or clavicular fracture
- Cervical Disk

- x-rays at stadium ruled out
shoulder dislocation; fracture

Physical Evaluation

- No midline neck tenderness
- Swelling, tenderness over left trapezius
- Minimal AC joint tenderness
- Continued painful dysesthesia through entire arm: C5-7 Dermatomes
- Manual muscle testing:
 - 5/5 grip, finger ext, abd, thumb ext, wrist flex and ext
 - 4+/5 triceps
 - 1/5 bicep and ant deltoid, some pec with forward flexion
 - No middle or post deltoid, rotator cuff for int or ext rotation



Differential Diagnosis: in clinic

- complete shoulder and c-spine films (including flex and ext views) normal
- MRI of neck and chest were ordered due to continued dysesthesia and weakness

Diagnostic Results

- MRI: extensive brachial plexus injury with neural foraminal asymmetry at C5-6 and C6-7 levels
- CT/Myelogram: left C5 and C6 nerve root sleeve avulsions and a stretch injury to C7 and less severe stretching of the nerve roots below



Plan

- Use of sling; protect the shoulder from subluxation
- Toradol and Vioxx for pain
- Add Neurotin for neurogenic pain
- Obtain EMGs at 3 week point if function has not returned

EMG

- 3 weeks post
- Abnormal sensory responses indicating involvement at or distal to the dorsal root ganglion.
- There was no evidence of activation of C5/6 upper trunk innervation
- Normal function of the rhomboid suggested that the lesion was distal to the takeoff of the dorsal scapular nerve (not a true nerve root avulsion).



Mayo Clinic Consultation



Allen Bishop, MD, Alexander Shin, MD, and Robert Spinner, MD

- Exam:

- Normal trapezius and latissimus dorsi function
- Surprisingly normal rhomboid function
- + Tinel's in the neck, radiating into the C5 and C6 distribution
- No deltoid, bicep, brachioradialis, or rotator cuff function
- Supination severely impaired
- Some pec major function, with atrophy of the clavicular head
- 4/5 tricep, wrist ext, finger ext, and pronation
- 5/5 wrist flex and finger flex

Surgical Intervention

- Supraclavicular incision to expose the left brachial plexus
- Electrophysiologic evaluation of C5/C6:
 - Motor-evoked potentials
 - Somatosensory-evoked potentials
 - Found a salvageable nerve root at C5, no viable root found at C6

Surgical Intervention

- Exposure of various lengths of nerve:
 - 10 cm radial nerve
 - 15 cm musculocutaneous nerve
 - 15 cm median nerve
 - 15 cm ulnar nerve
 - 5 cm axillary nerve
 - 10 cm spinal accessory nerve
- Harvest of 36 cm of left sural nerve



Surgical Intervention

- Neurotization of the biceps motor branch of the musculocutaneous nerve with 2 fascicles of the ulnar nerve (Oberlin transfer for biceps reanimation)
- Nerve transfer of the motor branch of the brachioradialis to the radial nerve
- Transfer 2 fascicles of the median nerve to the brachialis motor branch of the musculocutaneous nerve

Surgical Intervention

- Nerve grafting with two 15 cm long cables of the harvested sural nerve from the C5 nerve root to the axillary nerve
- Transfer of a portion of the spinal accessory nerve to the suprascapular nerve



Post-Op Condition

- 5 incisions closed with sutures and steri-strips
 - Supraclavicular
 - Infraclavicular
 - Bicep
 - Lateral knee
 - Lateral ankle
- Placed in posterior splint and shoulder immobilizer for 3 weeks

Surgical Incisions



Secondary Complications

Constant left shoulder subluxation



Solution

Hemi Arm Sling

- Sammons Preston Rolyan





Rehabilitation Goals

- 90 degrees of active shoulder flexion and abduction
- to touch the opposite shoulder (and hand to mouth)
- Protect the shoulder
- Pain-Free



Rehabilitation

- PROM/AAROM to prevent capsulitis in shoulder and elbow
- AROM and manual resistance progressing to resisted exercise for the left UE as tolerated
- Cardiovascular exercise and general strengthening of lower body and right UE



Rehabilitation

- Modifications were made to exercises so that gravity was eliminated
- Bilateral exercises (lat pull down, bench, biceps/triceps with bar) were used to reinforce assistance & stabilization
- Pulleys and cables were used for active assistance

Rehabilitation

- Russian stimulation to left bicep, intensity to visible muscle contraction



Rehabilitation

- EMS 2-A Direct Current Stimulation to other denervated musculature





4 month follow up

- EMG showed early signs of reinnervation in the bicep and deltoid
- Still no signs of reinnervation of the suprascapular nerve



4 month follow up

- Able to actively reduce his left shoulder
- Manual muscle testing:
 - 0/5 rotator cuff
 - 2/5 bicep and deltoid
 - 3+/5 pronation
 - 4/5 triceps
 - 5/5 hand intrinsics
- Return in 4 months for another EMG

8 Month Follow up

- Continued to gain strength with the left arm; Able to bring hand to head & abduct shoulder to 60 degrees.
- Pain decreased to minimal
- Shoulder ROM improved with assisted stretching & shoulder remained located
- No suprascapular nerve function



Psychosocial Implications

- Atrophy caused severe asymmetry - he wore sweatshirts in the summer
- Went from Division I superstar to “Disabled”



Conclusion

- Velocity required to avulse the nerve roots typically occurs with MVA
- Athletic trainers should recognize the possibility of severe brachial plexus injuries in sport
- Rehabilitation involved with nerve root grafting is slow and expected outcomes are for activities of daily living rather than return to sport