

Foundations Curriculum-Stingers/Burners

❖ Pre-reading:

- Bowles DR, Canseco JA, Alexander TD, Schroeder GD, Hecht AC, Vaccaro AR. The Prevalence and Management of Stingers in College and Professional Collision Athletes. *Curr Rev Musculoskelet Med.* 2020;13(6):651-662. doi:10.1007/s12178-020-09665-5.

❖ Pre-Questions

- What is the most common finding reported when someone sustains a stinger/burner?
 - Loss of consciousness
 - Weakness
 - Neck pain
 - Tingling
- When a stinger occurs as a result of a direct compression mechanism, what nerve roots are typically affected.
 - C3 and C4
 - C4 and C5
 - C5 and C6
 - C6 and C7
- True or False – Stingers are the 2nd most common cervical spine injuries in collision sports?
 - True
 - False
- True or False – If you are going to diagnose a stinger the symptoms must be unilateral?
 - True
 - False
- True or False – If someone presents to the ED with their second stinger and symptoms have lasted > 24 hours this requires imaging to be performed in the ED?
 - True
 - False

❖ Chief complaint

- A 20-year-old football player with persistent pain, weakness and numbness/tingling in the right neck and right upper extremity following a football game about 30 hours ago.

❖ Vital signs

- BP: 117/69 HR: 95 RR: 14 O2: 99% on RA T: 36.7C Wt: 92kg

❖ What does the patient look like?

- The patient is in mild pain, sitting up on the stretcher

❖ Primary survey

- Airway: speaking in full sentences

- Breathing: no apparent respiratory distress
- Circulation: warm and dry skin, normal capillary refill

❖ Action

- Place patient on the monitor, establish IV access, place a cervical collar and maintain C-spine precautions.

❖ History

- Source: Patient
- HPI: This is a 20-year-old male college football player who comes to the ED for evaluation about 30 hours after an injury was sustained during his most recent football game. He presents with right sided neck pain, right upper extremity numbness and tingling, and right upper extremity weakness that started immediately after he tackled an opposing player during the game. Initially he described it as a shock down the right arm. He noticed numbness and tingling to the hand and sharp shooting pains of the right arm from the shoulder down. The pain has subsided since the initial injury but is still present in the neck and right arm. He also stated that his right upper extremity is weaker than the left. He is complaining of right sided neck pain. He stated that he had 1 other injury similar to this during spring football practice 6 months ago and one similar injury 2 years ago in high school, but all of his symptoms went away less than 5 minutes after the injury occurred each of the other times and he never told anybody about the injuries. Otherwise, ROS is negative.
- PMHx: None
- PSHx: R knee ACL repair
- Allergies: none
- Meds: ibuprofen and Tylenol as needed
- Social Hx: Denies tobacco, alcohol or drug use
- FHx: No relevant history

❖ Secondary survey

- General: alert, oriented × 3, uncomfortable, neck and RUE pain
- HEENT: PERRL, EOMI, MMM, TM intact, Oropharynx WNL
- Lungs: CTAB, No rales, wheezes or rhonchi, normal work of breathing
- Cardiovascular: RRR, no murmurs, rubs or gallops. 2+ peripheral pulses, cap refill <2 sec.
- Abdomen: Soft, NT/ND, No rebound or guarding
- Rectal: Normal tone, no masses, no blood
- Extremities: No obvious deformity. Full passive ROM of the right upper extremity. Decreased active ROM of the right upper extremity secondary to pain and weakness. Full active and passive ROM of the left upper extremity. 2+ radial pulses bilaterally
- Neck/back: tenderness to palpation in the right paraspinous musculature, positive spurling test, no midline cervical/thoracic/lumbar spine tenderness, decreased active cervical spine ROM.
- Neuro: Normal mental status
 - CN II-XII intact;

- Reflexes: +2 triceps, biceps and brachioradialis bilaterally
- Sensory: decreased sensation to light touch in the right hand globally, normal sensation of the left upper extremity.
- Strength: Right upper extremity: 4/5 right shoulder abduction, 4/5 right elbow flexion, 4/5 right forearm supination, 5/5 wrist flexion and extension, 5/5 grip strength. Left upper extremity: 5/5 strength of left upper extremity.

❖ Action

- Instructor prompt: learners should discuss differential diagnosis
 - Differential diagnosis: brachial plexopathy, cervical spine fracture, herniated disk/spinal stenosis w/nerve root impingement, paraspinous muscle strain, clavicular fracture, shoulder dislocation, humerus fracture, AC separation, rotator cuff injury
 - Discuss NEXUS Criteria and Canadian C-spine criteria for clearing C-spine in the ED without any imaging. The learner will be unable to apply either of these decision rules in this case due to the right upper extremity neurologic symptoms.
- Obtain labs
 - CBC, CMP, Type and Screen, PT/INR
- Order meds
 - Pain control: Consider acetaminophen, NSAIDS and/or Opiates
- Order Imaging Studies
 - X-ray imaging: Obtain AP, oblique and odontoid views of the cervical spine.
 - MRI: C-spine MRI would be recommended in this case due to the duration of symptoms and the recurrent nature of his injury.
 - CT: If MRI is not available CT imaging is an alternative.
- Reassess
 - The pain is improved after analgesics. His weakness has resolved on repeat examination. Currently the patient has 5/5 strength in the bilateral upper extremities. He has no focal sensory deficits. He has 2+ upper extremity deep tendon reflexes. His vital signs remain stable.

❖ Results

- Lab results Table (Figure 1): Normal
- X-ray C-spine (Figure 2): Normal. If the learner asks for X-ray imaging of the R shoulder or R arm it will be normal.
- MRI C-spine (Figure 3): Cervical spinal stenosis at C5-6. No evidence of fracture of the cervical spine. No evidence of ligamentous or soft tissue injury to the cervical spine.

❖ Disposition

- The learner can now clear the cervical collar and C-spine precautions following the MRI and resolution of the patients' symptoms on repeat examination.
- No specialty consultation is required at this time in the ED because the symptoms have resolved.

- The learner should counsel the athlete on not returning to sport at this time until cleared as an outpatient by their team physician because this is now his 3rd stinger and he had prolonged symptoms requiring a visit to the ED this time.
- The patient can be discharged home at this time.

❖ **Diagnosis**

- Recurrent brachial plexopathy with cervical spinal stenosis predisposing the patient to this condition

❖ **Critical Actions**

- C-collar placement
- Pain control
- Complete neurological and MSK examination of the neck and upper extremities
- Imaging studies because this is a recurrent brachial plexopathy and he has had a prolonged duration of symptoms
- Identifying the cervical spinal stenosis and disc extrusion as a predisposing factor to recurrent brachial plexopathy.

❖ **Instructor Guide**

- This is a case of recurrent brachial plexopathy, caused by a traction injury of the brachial plexus and neuropraxia sustained while making a tackle during a football game. The learner must perform a thorough physical examination and the instructor should ask for specifics regarding the MSK and neurologic portions of the physical examination. Because this patient has had a prolonged duration of symptoms and this is now a recurrent injury the learner should obtain imaging in the emergency department. Imaging should include x-rays of the cervical spine and an MRI if available. If MRI is not available CT is an acceptable alternative. The learner should ensure the patient has adequate pain control while waiting in the emergency department for the workup to be complete. The patient should be referred to follow up with his PCP and/or sports medicine physician.

❖ **Case Teaching Points**

- Burners/Stingers arise from multiple mechanisms. They can occur from a traction injury to the brachial plexus with contralateral lateral neck flexion and ipsilateral shoulder depression. Another mechanism is ipsilateral lateral neck flexion and hyperextension causing a brachial plexus compression injury. Lastly a direct compression injury to the brachial plexus at Erb's point can cause a stinger.
- The direct compression mechanism is the most common among American football players. Injury at Erb's point occurs in the area superior to the clavicle where the C5 and C6 nerve roots combine to form a trunk of the brachial plexus.
- Most commonly we will see injuries to the C5 nerve root and parts of the C6 nerve root. This will lead to motor weakness with the most commonly affected muscles being the deltoid, supraspinatous and biceps brachii. With that being said there are reports of brachioradialis, pronator teres and supinator involvement with a stinger.

- The most common presenting symptoms will be sharp pain and reduced neck range of motion. The pain will typically start in the supraclavicular area and then will radiate down one arm in a non-dermatomal pattern. Pain will typically be circumferential in nature.
- Burners/Stingers are the most common cervical spine injury in collision sports.
- Of American college football players who were surveyed regarding stingers 77% reported tingling, 61% reported numbness, 44% reported weakness, and 17% reported neck pain.
- This injury is often underreported by athletes. A survey of college football players revealed 65% had experienced at least one stinger in their careers and 70% of those did not report it to the medical staff. This makes history gathering more important because this could be a recurrent issue for the athlete.
- The majority of these will resolve quickly and the athlete will likely not require an ED visit. One survey of high school and college rugby players revealed 80% recovered in less than a day and only 6% took up to two weeks for full recovery.
- If symptoms persist or are recurrent for the athlete, then imaging with X-ray and MRI of the cervical spine is indicated. For prolonged symptoms we can consider referral for EMG (can be performed as early as 7 days from the time of injury).
- If we are to diagnose a stinger, we must ensure that symptoms are unilateral. If the symptoms are bilateral a workup must be performed to ensure that there is not an injury to the cervical vertebrae or a cervical spinal cord injury.
- In the ED we could attempt to apply the NEXUS or Canadian C-spine criteria. They may have focal neurologic deficits on exam if presenting to the ED which would preclude the provider from using either one of these to clear their cervical collar. In addition, the Canadian C-spine rules use “axial load injury” as a dangerous mechanism and it may be difficult to ascertain whether or not the athlete sustained a true axial load for the ED provider. Out of caution we would have to likely presume an axial load injury occurred.
- The patient may arrive on a spine board with a cervical collar in place if being transported directly after sustaining the injury. The spine board can likely be removed on the patient after arrival to the ED, but cervical spine precautions should be maintained in all scenarios until the patient can be cleared clinically or with the aid of imaging studies.
- In order to be cleared for return to play (practice or game setting) the player must have complete resolution of symptoms and normal strength and range of motion in the previously affected extremity. The majority of athletes do not end up missing any significant playing time.
- To reduce further injury or recurrent stingers we should suggest changing to a higher riding shoulder pad or adding on a neck roll.

❖ References

- **Original Case Source:** Original Case
- **Primary Editor:** Brandon Godfrey, MD
- **Additional Editors:** Anna Waterbrook, MD CAQ-SM
- **References**

- Images courtesy of <https://radiopaedia.org/articles/cervical-canal-stenosis>, <https://radiopaedia.org/cases/normal-cervical-spine-radiographs>
- Abbasi, D. Burners & Stingers. Orthobullets. Published 2020. Accessed January 4, 2021. <https://www.orthobullets.com/TopicView.aspx?id=3115>
- Ahearn BM, Starr HM, Seiler JG. Traumatic Brachial Plexopathy in Athletes: Current Concepts for Diagnosis and Management of Stingers. *J Am Acad Orthop Surg*. 2019 Sep 15;27(18):677-684. doi: 10.5435/JAAOS-D-17-00746. PMID: 30741724.
- Bowles DR, Canseco JA, Alexander TD, Schroeder GD, Hecht AC, Vaccaro AR. The Prevalence and Management of Stingers in College and Professional Collision Athletes. *Curr Rev Musculoskelet Med*. 2020;13(6):651-662. doi:10.1007/s12178-020-09665-5.
- Hoffman JR, Wolfson AB, Todd K, Mower WR. Selective cervical spine radiography in blunt trauma: methodology of the National Emergency X-Radiography Utilization Study (NEXUS). *Ann Emerg Med*. 1998 Oct;32(4):461-9. doi: 10.1016/s0196-0644(98)70176-3. PMID: 9774931.
- Kuhlman G. Burners (stingers): Acute brachial plexus injury in the athlete. UpToDate. Published 2019. Accessed January 5, 2021. <https://www.uptodate.com/contents/burners-stingers-acute-brachial-plexus-injury-in-the-athlete>
- Stiell IG, Wells GA, Vandemheen KL, Clement CM, Lesiuk H, De Maio VJ, Laupacis A, Schull M, McKnight RD, Verbeek R, Brison R, Cass D, Dreyer J, Eisenhauer MA, Greenberg GH, MacPhail I, Morrison L, Reardon M, Worthington J. The Canadian C-spine rule for radiography in alert and stable trauma patients. *JAMA*. 2001 Oct 17;286(15):1841-8. doi: 10.1001/jama.286.15.1841. PMID: 11597285.
- Torg JS, Naranja RJ Jr, Pavlov H, Galinat BJ, Warren R, Stine RA. The relationship of developmental narrowing of the cervical spinal canal to reversible and irreversible injury of the cervical spinal cord in football players. *J Bone Joint Surg Am*. 1996 Sep;78(9):1308-14. doi: 10.2106/00004623-199609000-00003. PMID: 8816644.

Figure 1:

WBC $10.4 \times 10^3/\mu\text{L}$

Hgb 15.1 g/dL

Hct 45.8%

Plt $325 \times 10^3/\mu\text{L}$

Na 142 mEq/L

K 4.4 mEq/L

Cl 104 mEq/L

CO₂ 26 mEq/L

BUN 50 mEq/dL

Cr 0.64 mg/dL

Gluc 98 mg/dL

PT 12.7

PTT 27 sec

INR 1.0

Figure 2: R (radiopaedia.org)

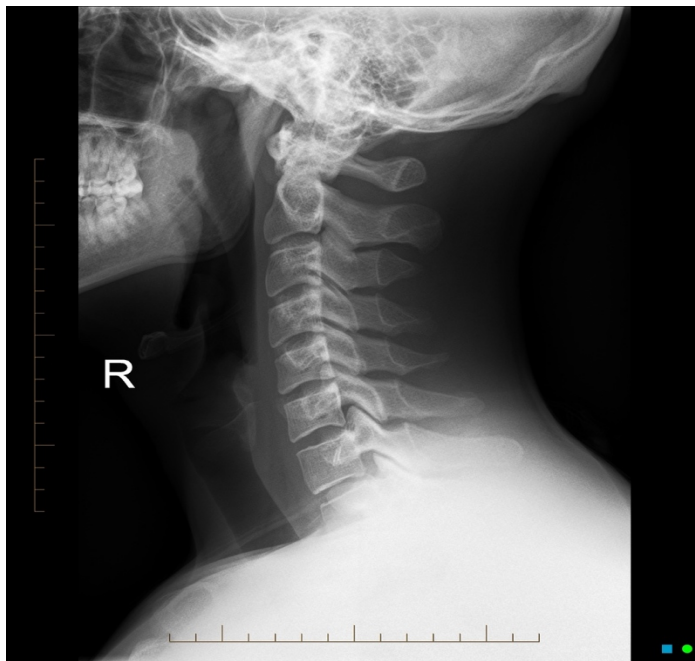


Figure 3: MRI (radiopaedia.org)



Post-Questions:

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