

Burners & Stingers

Brachial Plexus Stretch Injuries

Burners or stingers are common injuries in American Football. It has been reported that there are 2.2 brachial plexus injuries per 100 players per year. It has been estimated that at the collegiate level approximately 50% of football players have sustained a stinger. Of these, it is estimated that 30% suffered their first injury while playing high school football. The injury is most common with tackling and blocking.

The brachial plexus is formed by the convergence of the fifth through eighth cervical and first thoracic nerve roots. The nerve roots combine to form three main trunks. The three trunks branch off and combine to form three cords, which then combine and branch to form the innervation for the upper extremity. The four main nerves at the end of the brachial plexus are the *Musculocutaneous*, *Median*, *Radial*, and *Ulnar* Nerves.

The mechanism of injury is a downward or backward blow to the ipsilateral shoulder with concomitant neck lateral flexion away from the affected shoulder. This results in an increase in the distance from the acromion of the scapula and mastoid process of the skull, stretching the brachial plexus. Repeat injuries can occur with neck lateral flexion toward the side of injury or hyperextension of the neck. This may be due to scarring and fixation of the brachial plexus to the scalene musculature, or cervical foramen narrowing.

The injury manifests itself with immediate sharp burning or stinging pain radiating from the clavicular area down the arm to the hand. There is an accompanying numbness and tingling of the arm that may last for only a few seconds to several minutes. True neck pain should not be involved with this injury, and if it is present, a cervical spine injury should be suspected.

Weakness may be present at the time of injury, and may last for one to several minutes. This is the familiar "dead arm" that football players appear to have after the injury. The affected musculature consists of: the deltoid, supraspinatus, infraspinatus, biceps, and on rare occasions the brachioradialis, supinator, and pronator teres.

These muscles arise from the upper trunk of the plexus. It has been postulated that the injury is more commonly at the trunk level and not the nerve root level. This is thought to be due to the noninvolvement of the cervical paraspinal muscles, serratus anterior, or rhomboids which are innervated by the Long Thoracic Nerve. The long thoracic branches from C5 and C6 thru C7, prior to the convergence of C5 and C6 to form the upper trunk. Proper evaluation of the

affected musculature will help to differentiate between a Brachial Plexus Stretch injury and a more severe nerve root or cervical spine injury.

CLASSIFICATION

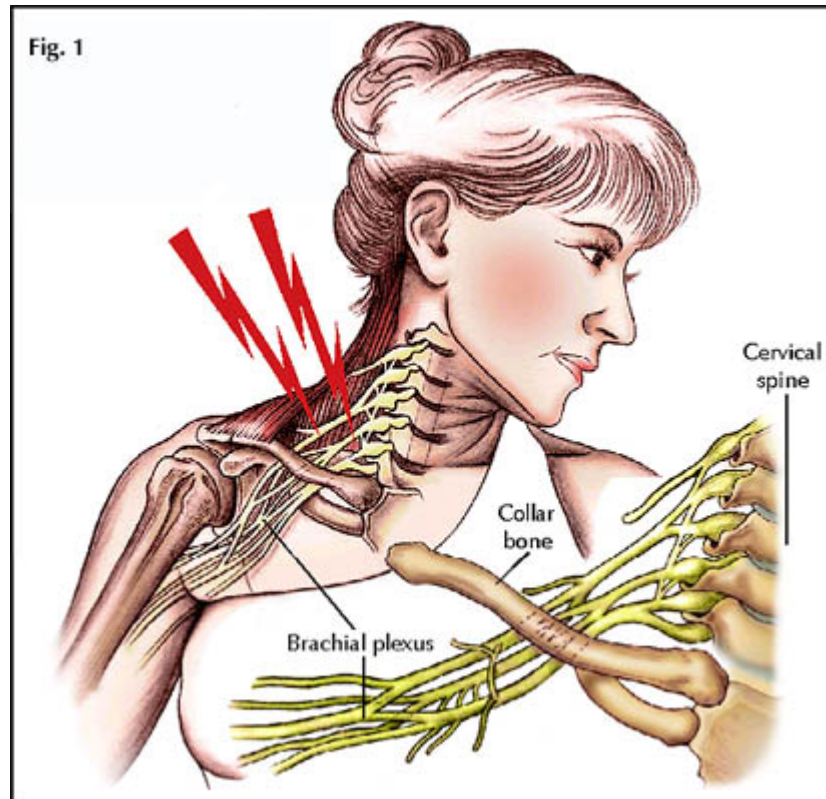
Most classification systems are based on the duration of motor weakness. Most grading systems involve a three tiered classification; Grade I, Grade II, and Grade III. Grade I injuries are the most common brachial plexus injuries with a transient loss of motor and nerve function, lasting from minutes to hours

completely resolving within two weeks. This may be due to edema surrounding the nerve or a demyelination of the axon itself. There is a complete return to strength within two to three weeks following injury that can be verified with EMG.

Grade II injuries exhibit motor weakness that will last for longer than two weeks. These individuals will eventually show complete clinical recovery. The recovery appears to come in two stages. There is an 80 to 90% return of strength in six weeks, with full strength returning in 6 months. EMG at three weeks post-injury may reveal classic evidence of muscle denervation with decreased motor unit potentials. After complete clinical recovery there may still be some deficits noted with EMG.

Grade III injuries are the rarest. The athlete will continue to exhibit symptoms for more than one year post-injury. These symptoms can include motor and sensory loss. An EMG of a suspected Grade III can show muscle denervation and three weeks and again at 3 months with out evidence of recovery. In some occasions, Grade III Brachial Plexus Nerve Injuries may necessitate surgical intervention.

The worst possible injury would involve a nerve root avulsion. Horner's Syndrome is an example of this type of injury. The classic signs are ptosis,



miosis, and anhidrosis. Ptosis refers to a drooping eye lid on the affected side. Miosis is a constricted pupil on the affected side. Anhidrosis refers to a lack of sweat on the affected side. This syndrome results in a disruption of the sympathetic fibers at the nerve root level. The most commonly affected level is C7. This is a medical emergency and needs to be recognized and treated as such.



MANAGEMENT

Management of this injury begins with a thorough clinical examination. On the field exam may include motor weakness and sensory deficits. Weakness and paresthesia will persist while the pain is present but should resolve rapidly after the pain subsides. Keep in mind that the muscles most commonly affected are the supraspinatus, infraspinatus, deltoid and biceps. Elbow flexion and shoulder flexion usually return first, and then shoulder rotation abduction will follow. Anaesthesia will appear to be patchy, and mostly present on the lateral shoulder. Neck pain and loss of motion are uncommon for true burners, and may represent cervical spine injury. Bilateral upper extremity burning may also be a sign of significant cervical spine injury.

On the field, if the athlete has no evidence of cervical injury, strength testing of the shoulder rotators, deltoid and biceps should be performed. When the athlete's subjective pain and weakness have resolved, and there is no evidence of weakness on examination the athlete can be allowed to return to play. Please note that the athlete should be followed through the next week to assess any delayed symptoms. If delayed symptoms are present, the athlete should be examined by a sports medicine physician.

Many physicians feel that all athletes should be examined after their first stinger, with a complete cervical radiograph series taken. If the athlete's symptoms have not resolved by two weeks post-injury, this designates a Grade II injury, and the athlete should be referred to have radiographs and an EMG at three weeks to identify any clinical pathology.

Grade I and II injuries should result in removal of the athlete from contact sports until symptoms and resistance to manual strength testing is normal. The athlete should be placed on a cervical and shoulder strengthening program as soon as tolerable following the injury. Return to normal sports is allowed when the athlete demonstrates normal strength and endurance in the affected shoulder. An EMG may not be an accurate criterion for return to sports. EMG can show persistent changes even with full strength return.

Upon return to competition football players should be fitted with a “neck roll” type device that restricts lateral flexion and posterior extension. Built-up or elevated shoulder pads will also assist with this protective measure. These additional pads should reduce the incidence of burners, but may not fully prevent them. Athletes who continue to suffer multiple burners should be allowed to continue participation only if no weakness is present. Strength loss should preclude continued participation.

Grade III injuries are treated in the same fashion as Grade I and II injuries. Return to contact sports is usually prohibited because of continued weakness.