This report aims to describe stingers and burners, their epidemiology, expected findings on history and physical examination, management and return to play considerations, as well as methods to prevent reinjury. It is important because stingers and burners, though they often do not have catastrophic consequences, are relatively common injuries in athletes. Also, as head up tackling is encouraged more and more as a way to prevent catastrophic spine injuries, stingers and burners may become even more prevalent.

**Definition**

A “stinger” or “burner” syndrome typically pertains to a transient stretch injury to the brachial plexus that usually follows sudden forceful trauma to the shoulder, commonly during contact sports activities, but may also occur due to cervical root injury. It usually produces symptoms going down the upper extremity of an individual after the injury, with characteristic “stinging” pain often lasting seconds to minutes and “burning” pain more than a couple of minutes that radiates from one side of the neck or shoulder to the fingertips. The pain typically is accompanied with variable sensory symptoms and multiroot weakness. In sports, although it is not associated with catastrophic sequelae, it is a major problem because of its frequent occurrence.

**Epidemiology**

It is believed in general that stingers and burners are common at all levels of collision sports, although they are probably under reported. Studies have shown that the incidence in collegiate players may be anywhere from 15-18%. Physical trauma to the brachial plexus is common in contact sports such as ice hockey, wrestling, and football. Of all sports-related peripheral nerve injuries, “burners” are more frequent than any other single nerve lesion.

Burners occur most commonly with tackling in football and because of this, are most often seen in defensive backs and linebackers. One study showed that 49% of Division I college football players had experienced at least one burner while playing in college. Another study showed that 65% of Division III players have had a formally diagnosed brachial plexus injury, with 70% not being reported on the first occasion (because of the symptoms’ transient nature), with a recurrence rate of 87%. Older players in collegiate and professional leagues, especially players with stenosis, cervical disk disease, degeneration, or other pre-existing conditions, or those with a lower Torg ratio (a measure of the cervical spinal canal diameter) tend to have more stingers and burners than others.
ratio has been found to have a poor predictive value for further injury, however, and is a poor screening method for participation in contact sports.10

In 1976, a rule change on spearing shifted tackling technique away from the head and toward the shoulder.12 Though protective against catastrophic neck injuries, this rule change may have promoted burners by leading to lateral flexion of the neck with contralateral shoulder depression7 (Figure 1). Burners appear to have increased from 49% in 1977 to 65% in 1992, even as the incidence of quadriplegia decreased from 34 in 1976 to 6 in 1992.7-8, 12

Pathophysiology

Nerve injuries are defined as neuropraxia, axonotmesis, and neurotmesis, depending on their severity. Neuropraxia is the mildest and most common type of injury wherein the nerves remain structurally sound, but focal demyelination causes a temporary conduction block, with temporary loss of sensation and motor function.2

Damage to the axon, with consequent Wallerian degeneration of the distal nerve end, is called axonotmesis, representing the next grade up in nerve injuries.2 The axon is able to slowly repair itself due to an intact epineurium layer, although complete recovery may take months.2

The most severe type, neurotmesis, is defined as injury to the entire neuron, the axon, and all of the surrounding connective tissue layers.2 With this, recovery varies, and surgery should be performed in a timely manner to encourage nerve regeneration, although the damage may still take a year to resolve, even if function returns.13

Mechanism of Injury

Stingers and burners typically result from contralateral flexion of the neck with depression of the ipsilateral arm (brachial plexus type of stretch injury) but may also be caused by extension compression of a nerve root at the cervical foramen, ipsilateral flexion with simultaneous extension of the neck, compression of an existing nerve root at the neural foramen, or a direct blow to the brachial plexus.1 For example, a football player’s shoulder pad may pinch the brachial plexus and may press the nerves against the superior medial scapula in a point where they are vulnerable (Erb’s point).14 The blow from an opponent’s helmet or shoulder pad may injure the nerve tissue between the player’s scapula and his own shoulder pads. In hockey or lacrosse, this may happen as well if a player is hit on the shoulder with someone else’s stick.14-17 Compression has been found to be the most common mechanism among college-age subjects.14,18 Because younger players have yet to develop predisposing spinal conditions, they tend to have stretch stingers rather than compression stingers.11,13,15

History and Physical Examination

Information about the pain quality, intensity, location, radiation, and duration of any stinger or burner should be obtained3 (Table 1). The exact mechanism of injury will be helpful in the diagnosis.3 As the name implies, a burning pain in the supraclavicular area radiating down the arm in a circumferential, nondermatomal pattern3 may be described. Associated weakness of the proximal arm muscles, specifically the deltoid, biceps, supraspinatus, and infraspinatus muscles,1 because