Many orofacial injuries during sports are preventable

By Eric Yabu, DDS

In 1998, Orlando Magic center Adonal Foyle took an elbow from Utah Jazz’s Quincy Lewis to teeth Nos. 8 and 9, causing the teeth to luxate back.

In 2001, Dallas Mavericks’ Dirk Nowitzki was elbowed by San Antonio Spur Terry Porter and tooth No. 8 was knocked out.

In 2003, Mavericks’ guard Steve Nash was struck in the mouth by Los Angeles Lakers’ forward Karl Malone, chipping tooth No. 9.

Just last year, Indiana Pacer Danny Granger had teeth Nos. 8 and 9 knocked out in a game against the Boston Celtics — he wears a stay-plate now.

The list goes on and on, and this is only the NBA. We don’t have enough space to delineate all the dental injuries hockey players have endured.

The most common type of injury

Dental injuries are the most common type of orofacial injury sustained during participation in sports. According to the National Youth Sports Foundation for Safety, in the United States, an estimated 5 million teeth are knocked out each year during sports activities.

Also, as the NBA examples support, almost all of these dental injuries involve the maxillary central incisors. A 2001 study by Gabris et al. found that 85.87 percent of all dental injuries from sports involved tooth No. 8 and/or 9.

Mouthguards significantly decrease injury incidence

So why isn’t every athlete at risk wearing a mouthguard? An athlete is 60 times less likely to sustain a dental injury when wearing a mouthguard.

In 1984, the American Dental Association estimated that face-masks and mouthguards prevent more than 200,000 orofacial injuries annually.

The ADA recommends mouthguards for participants in the following sports: acrobatics, basketball, boxing, discus throwing, field hockey, football, gymnastics, handball, ice hockey, lacrosse, martial arts, racquetball, rugby, shot putting, skateboarding, snowboarding, skiing, skydiving, soccer, squash, surfing, volleyball, water polo, weightlifting and wrestling.

While the skydiving recommendation is a little dubious (Is it really going to make a difference if the parachute doesn’t deploy?), it would stand to reason that most of these sports organizations should mandate mouthguard use to protect its participants.

However, in the U.S., mouthguard use is only required at some level in football, boxing, ice hockey, field hockey and lacrosse.

The NFL does not require mouthguard use and, as a result, sees not higher than 50 percent of its players protected with one.

Mouthguards are not only useful for protecting teeth from fractures, luxations or avulsions. They are also critical for protecting against soft tissue lacerations, damage to the periodontium, mandibular and
Room for debate

There is still some debate about the effectiveness of mouthguards in terms of reducing the incidence and severity of concussions. However, it stands to reason that if there is not adequate cushioning of the mandible, a blow to the jaw could cause the condyles to be violently pushed into the base of the skull and even into the brain cavity.

A mouthguard could provide this cushioning as well as create a buffer space between the condyle and the fossa by translating the mandible forward due to the thickness of the guard.

A study by Hickey et al., that was published in the Journal of the American Dental Association in 1967 used cadavers to measure the amount of force transmitted through the skull.

Their measurements with and without mouthguards showed that the amount of intracranial pressure and bone deformation in the skulls reduced significantly with a mouthguard in place.

Three types of mouthguards

All mouthguards are not the same. Basically, there are three types of mouthguards.

Type I: The first are stock mouthguards. These are not fitted or customized to the teeth or alveolus in any way. They are simply taken out of the box and slipped into the mouth.

They tend to be uncomfortable and hamper speech and breathing because they are bulky and teeth need to be clenched for retention.

The only advantage is that they are inexpensive, available for $1 to $15 in sporting goods stores.

Type II: These mouthguards are the “boil and bite” variety. These represent about 90 to 95 percent of the mouthguard market.

While newer versions of these can look and sound quite impressive — e.g., Shock Doctor, Brain-Pad — and can even come with a $1,500 guarantee for dental injuries suffered during wear, they are not particularly protective and tend to be even less comfortable.

These mouthguards rely on the user boiling the appliance and then biting and molding it to create the fit.

Quite often, the guards’ biting surfaces are thinned out from 70 to 100 percent, leaving them with minimal occlusal thickness or even perforations.

As with the Type I mouthguards, their advantage is cost, selling for $1 to $40.

Type III: These mouthguards are the truly customized guards. They are formed by vacuum or pressure forming one or more sheets of ethylene vinyl acetate (EVA) over a dental cast of the athlete’s mouth, usually maxillary.

They offer excellent retention and a high level of acceptance due to comfort.

However, they are more expensive than store-bought guards, ranging from $100 to $1,500.

Vacuum formed vs. pressure formed. Type III mouthguards should be broken up into two sub-types: vacuum formed and pressure formed. The former are fabricated using a traditional vacuformer, which uses 1 atmosphere of vacuum suction to pull the EVA down over the model.

It is difficult to laminate two or more layers with this technique and, because the pressure is minimal, deformation of the guards occurs over time due to the elastic memory of the EVA material.

Pressure-formed mouthguards are the gold standard of mouthguards today. They are fabricated by using a positive-pressure thermoforming machine that may exert up to 10 ATM of pressure.

There are three such machines on the market: Drufomat by RainTree Essix, BioStar by Great Lakes Orthodontics, and Erkopress by Glidewell Laboratories.

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These allow for extremely precise adaptation and chemical fusion between multiple layers. The units generally run in the $3,000 range.

**Mouthguards round out your service options**

Because of the prevalence of sport injuries and the fact that athletes are participating at even younger ages, today’s dental office should be prepared to offer a Type III custom mouthguard to its patients.

While the cost of purchasing the equipment to fabricate these guards may be prohibitive, there are many laboratories — such as Glidewell, Great Lakes Orthodontics and Mahercor Laboratories — as well as manufacturers, such as Pure Power Mouthguards and Under Armour, that can help provide the service.

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**About the author**

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