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Oral Health Issues for Adolescent Athletes

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Standardized definitions of the adolescent period often fail to capture the complexities that live within the growing, developing, and maturing individual adolescent. The dynamics associated with the concurrent physical, hormonal, emotional, and social changes not only focus the former child toward maturity and acculturation into the social milieu of adulthood but may also contribute to antisocial actions and problem risk-taking behaviors. Perhaps one might suggest an alternative characterization of adolescence as a transitional period of living with contradictions.

One focus of attention during this transitional period for many adolescents is an emphasis on the importance of sports. Adolescents should be encouraged to engage regularly in vigorous physical activities and to experience the exhilaration of competing in organized sports to the level of their individual capabilities. Adolescents not only benefit physiologically from the positive effects of sustained exercise but self-awareness, skill development, and a sense of accomplishment may also contribute psychologically to the overall health, self-esteem, and well-being of the individual adolescent athlete.

Despite all of these healthful benefits associated with participating in sports, increased risks must be acknowledged. One essential goal for health professionals including the dental team is to focus on optimizing the benefit-to-risk ratio for player safety and health. One critical aspect of this focus is to promote sports-specific preventive measures for the gamut of potential oral conditions, particularly sports-related traumatic dental injuries. Dental practices that provide such services to their patients are encouraged to

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develop trauma-ready office protocols that facilitate triage and effective management of sports-related oral injuries—plans that will not jeopardize the health of injured athletes or inhibit their ability to continue participating in sports.

This article is intended to provide the dental team with clinically relevant information to enhance overall awareness and understanding of some of the more common oral health care needs of their adolescent dental patients who participate in the expanding arena of sports.

Adolescent growth and development

Physiologic changes

The physiologic and psychologic growth and maturation that take place during the adolescent phase of development contribute to transitioning the child toward adulthood. This phase of development generally extends from the onset of puberty, including the physical and biologic changes that are associated with sexual maturation, to the end of the teenage years [1].

Girls enter puberty earlier than boys (age 8–14 years versus age 10–16 years) and complete this process within approximately 3 years compared with boys who require approximately 6 years for completion. As a result of this growth and maturational differentiation, girls grow taller earlier, whereas boys grow taller for a longer period of time. Therefore, on average, boys are taller than girls at growth completion [1].

Normal growth and development of the cardiovascular, neuromuscular, and cognitive/integrative systems are key factors related to attributes such as sports preparedness, training capabilities, and skill development. These attributes contribute to enhancing the benefits and minimizing the risks for adolescent athletes [2].

Psychosocial changes

Navigating through the dichotomies of the adolescent phase of development often is confounded by physical growth changes, hormonal fluctuations, and mood swings. The discovery and turmoil of adolescence are frequently intensified by internal and external demands, expectations, and pressures [3].

For the adolescent athlete, these performance stressors may be precipitated internally by the individual's quest for independence and self-identity, while at the same time establishing group acceptance and a reputation as a team player. Performance stressors also might be precipitated externally by parents, teachers, coaches, and peers. It is fortunate that for many adolescent athletes, pent-up energy is released during workouts, practice sessions, or in competition. The emotional outlet from physical exertion is one of the many benefits associated with participating in sports. On the other hand, pent-up emotions could find expression in various forms of

antisocial actions or problem risk-taking behaviors during adolescence—behaviors that may be harmful not only to the athletes themselves but also to others [3].

A practical approach for the dental team in addressing some of the behaviors that may be encountered with teen athletes can be found in the section *How Health Professionals Can Influence Adolescent Athletes*.

Adolescent oral health concerns

In-depth presentations of oral health concerns experienced by adolescents in general are provided elsewhere in this issue. Noteworthy among these are the following:

- A shift in the pattern of dental caries from minimal pit-and-fissure lesions to more extensive interproximal lesions to devastating rampant caries—all of which are influenced by the combined effects of less than meticulous oral hygiene
- High-carbohydrate diets accompanied by snacking on demand, consumption of sweetened soft drinks, carbonated sodas, and sports replacement drinks
- Development of periodontal diseases based on poor diet choices and lack of proper oral hygiene, gingival changes associated with adolescent hormonal fluctuations, soft tissue changes associated with the abuse of alcohol and tobacco products, and oral manifestations of sexually transmitted diseases
- Structural, functional, and esthetic problems associated with malocclusion and temporomandibular disorders
- Pain and pathology associated with developing and erupting third molars
- Oral and systemic manifestations of eating disorders such as anorexia nervosa, bulimia nervosa, and the female athlete triad in addition to the recently identified crisis in male body obsession termed the "Adonis complex"
- Escalating problems associated with various forms of body art such as branding, tattooing, piercing, and tongue splitting
- Increased potential for accidental dental trauma associated with motor vehicle collisions, acts of teen violence, or participation in sports

The intent of this article is not to be repetitious in presenting information contained in other articles in this issue but to present specific information on those areas that are related most commonly to adolescents who participate in sports.

Sports-related dental injuries

Dental trauma sustained by adolescent athletes is described in the following sections that discuss the prevalence of sports-related traumatic dental

injuries, the prediction of these injuries, and their prevention through the use of protective athletic equipment (specifically, properly fitted athletic mouthguards) [4]. It is outside the scope of this article to address diagnostic and treatment protocols for dental trauma.

Prevalence

A national study reporting the overall prevalence of traumatic dental injuries (from all causes) to the teeth of individuals in the United States [5] demonstrated that nearly one fourth of the United States population had experienced one or more traumatic dental injuries and that the male-to-female ratio of dental trauma was 1.0:1.5. Race was determined not to be a statistically significant causal factor for traumatic dental injury prevalence. Most dental injuries occurred to the maxillary anterior teeth, with the maxillary central incisors most frequently involved [5]. Other investigators demonstrated that the most frequent type of dental injuries to the primary anterior teeth were intrusive luxations, whereas crown fractures were most frequent in the permanent dentition [6].

When consideration is given to the clinical observation that most patients demonstrate an Angle Class I or Class II malocclusion, the results of the previously noted prevalence data are consistent with clinical expectations. Furthermore, the rationale presented by the American Society for Testing and Materials for placement of an athletic mouthguard on the maxillary arch for athletes who have Class I or Class II malocclusions and on the mandibular arch for athletes who have Class III malocclusions becomes more readily apparent and remains consistent with current prevalence data [7].

Sports-specific prevalence for dental trauma was reported in a review article consisting of more than 100 publications from the scientific literature spanning the past 2 decades [8]. The investigators concluded that among the various individual and team sports and geographic regions that were reviewed, injury rates were relatively similar. They cautioned, however, that in all likelihood, dental injuries are under-reported because of the lack of any standardized national or international reporting mechanisms. These investigators endorsed the creation of a dental trauma registry and affirmed the efficacy of athletic mouthguards for preventing oral injuries in sports [8].

Prediction

The ability to predict with accuracy the likelihood that an individual adolescent may or will sustain a sports-related traumatic dental injury is essential information for the dental team in making appropriate protective-equipment (mouthguard) recommendations to improve the benefit-to-risk ratio and decrease the morbidity associated with such injuries. This public health issue becomes even more critical when consideration is given to the increasing number of adolescent boys and girls who participate in sports

[9]. It seems logical to suggest that as the number of adolescent athletes increases, the number of exposures to potential traumatic dental injuries increases proportionately. With this rationale in mind, an index for predicting the likelihood of sports-related traumatic dental injuries in children and adolescents was developed.

The Predictive Index (PI) was reported as a Bayesian probabilistic model in which 14 causal factors were identified and prioritized by an expert panel [10]. The specific set of causal factors included age, sex, malocclusion, and previous history of dental injury; use of a helmet, facemask, and mouthguard; velocity and intensity of the sport; level of activity, exposure time, and focus of attention; and level of coaching and level of sport. These 14 causal factors, when reported by individual athletes, enable dentists to perform computer-based chair-side risk assessments for early detection of athletes at risk for dental injuries and to make informed recommendations for properly fitted athletic mouthguards to reduce the likelihood of future sports-related dental injuries [10]. Subsequent to its initial introduction, the PI was tested with a sample of 30 experienced dentists and a group of 30 dental specialty residents. The PI was statistically determined to be valid and usable; further testing is ongoing [11].

Prevention

The effectiveness of mouthguards for preventing sports-related injuries to the teeth, oral soft tissues, and jaws is well established and accepted [12–14]. Protection is enhanced further in those sports that require mouthguards, helmets, and facemasks. Included among this group of amateur sports are boxing, football, ice hockey, and lacrosse. Amateur field hockey also requires a mouthguard but not a helmet or facemask. The only professional sport that requires a mouthguard is boxing [15,16].

Despite the acknowledged effectiveness of mouthguards, even for sports in which they are required, players, coaches, and referees are not 100% compliant with existing mouthguard rules [17–20]. Players cite various reasons for not complying with mandates, such as lack of proper fit, lack of comfort, interference with breathing, and interference with the ability to speak. These reasons are understandable when one considers that most mouthguards currently used are type 2, boil-and-bite mouthguards that are fitted (often improperly) by the players themselves. Type 1, over-the-counter mouthguards are even less acceptable because they are manufactured in one size that is intended to fit all players [7,15,16]. This situation is akin to offering every player on the team a pair of athletic shoes—all of which are the same size.

Alternatively, type 3, custom-fabricated mouthguards are made over a stone cast of an individual athlete's dental arch (Fig. 1). Custom-fabricated mouthguards offer the best possible fit, the most protection from injury, and interfere the least with breathing and speech. For all of these reasons,

Fig. 1. Custom-fabricated mouthguards are effective in reducing the number and severity of sports-related traumatic injuries to the teeth, intraoral soft tissues, and jaws.

properly fitted custom-fabricated mouthguards are most highly recommended by the sports dentistry community [4,7,15,16,21,22].

Various laboratory techniques have been developed for custom fabrication of athletic mouthguards. The two most popular techniques are the vacuum-forming technique and the pressure-laminating technique [15,16,22]. Other techniques that have been proposed for custom mouthguard fabrication are the vacuum-pressure technique and the photopolymerized urethane diacrylate technique [23–25].

Despite of the acknowledged effectiveness of mouthguards for protecting the teeth, oral soft tissues, and jaws of athletes, less conclusive evidence exists to support the contention that mouthguards are effective in reducing or eliminating mild traumatic brain injuries (concussions). Although this contention is espoused by many on theoretic, intuitive, and observational levels, more statistically valid scientific data are required to substantiate the efficacy of mouthguards for concussion prevention [26]. Regardless of the outcomes of future research to determine the relationship between concussion prevention and the use mouthguards, the use of properly fitted mouthguards must continue to be recommended vigorously on the established basis of their effectiveness in preventing sports-related injuries to the teeth, oral soft tissues, and jaws.

Nutrition for adolescent athletes

General considerations

The nutritional requirements of adolescents are based on achieving optimal growth and development. The importance of a well-balanced diet cannot be overemphasized, and major deviations cannot be overlooked. Adopting fad diets over long periods may predispose the adolescent to deficiencies of specific nutrients that may cause negative developmental consequences. Likewise, persistent overeating and lack of proper physical exercise

have contributed to the growing number of obese adolescents who have increased potential for cardiovascular diseases and diabetes.

Athlete considerations

The nutritional requirements of adolescent athletes are based on achieving optimal growth and development and on meeting the physical demands of participating in sports [27,28]. Proper nutrition plays a pivotal role in the success of competitive adolescent athletes.

A general sports diet for adolescent athletes encompasses all of the guidelines of a healthful, well-balanced diet, with some specific recommendations [27,29]. This sports-diet pattern is based on modifications to the standard food pyramid and includes the following number of servings per day: 9 bread; 4 vegetable; 3 fruit; 2 to 3 dairy; and 2 to 3 meat. This diet pattern permits a higher proportion of micronutrients and dietary diversity. Caloric and specific macronutrients require individualization based on the age of the athlete, level of activity, and frequency of exercise.

Fluid replacement is another essential aspect of performance nutrition for adolescent athletes—one that is sometimes overlooked. Fluids contribute to athletic performance by transporting nutrients to active muscle tissues, maintaining body temperature through heat dissipation, and eliminating waste products through perspiration. It is essential to maintain sufficient fluid levels during training, before an event, during hard exercise, and after exercise. To avoid dehydration, athletes need to ingest a sufficient amount of fluid to avoid the sensation of thirst. For most adolescent athletes, cold water is an excellent fluid replacement source. For endurance athletes, sports drinks or diluted juices are beneficial, particularly during extended periods of exertion [29,30].

Disordered eating

It is important to differentiate between the terms *disordered eating* and *eating disorders* [27]. Disordered eating involves various unhealthful weight control practices such as fad dieting, fasting, vomiting, and misusing diet pills, diuretics, or laxatives. Such practices often are associated with sports that emphasize lean body appearance, such as dancing, diving, figure skating, gymnastics, and synchronized swimming. Also included are sports in which leanness for optimal performance is emphasized such as cross-country skiing and long-distance running. Sports with weight limit classifications such as rowing, weight lifting, boxing, wrestling, and various forms of the martial arts place these athletes at greater risk for disordered eating [31–33].

Eating disorders

Eating disorders are accompanied by serious consequences and often are based on underlying psychologic issues. In addition to their psychologic basis, other serious systemic manifestations can include but are not limited to

the following: cardiovascular (bradycardia, hypotension); gastrointestinal (bloating, constipation); hematologic (anemia, thrombocytopenia); reproductive (decreased estrogen, elevated cortisol); bone loss (osteopenea in girls, osteoporosis in women); thermoregulation (dehydration, metabolic alkalosis); and even death. For a definitive diagnosis of an eating disorder, adolescent athletes must meet the criteria established for anorexia nervosa or bulimia nervosa [27,34].

The oral manifestations of eating disorders may include one or several of the following conditions: smooth erosion of the lingual surfaces of the teeth (perimylolysis) caused by recurrent vomiting; decreased vertical dimension, chipped incisal edges, and floating amalgams secondary to erosion of tooth enamel; traumatized oral mucous membranes and pharynx from the use of a finger or other object to self-induce vomiting; xerostomia as a side effect of psychotropic medications, fluid imbalance caused by misuse of diuretics and laxatives, or decreased salivary flow as the result of binge eating and purging; enlargement of the parotid glands [27,33,34].

Anorexia nervosa

More than 90% of people who have anorexia nervosa are women under age 25 years. They are most often affluent, white, and of at least normal intelligence [34]. The following four criteria are required to establish a diagnosis of anorexia nervosa: (1) refusal to maintain body weight at or above a minimally normal weight for age and height; (2) intense fear of gaining weight or becoming fat; (3) distorted perception of body weight or shape, and (4) absence of at least three consecutive menstrual cycles (amenorrhea) in postmenarchal women. There are two subtypes of anorexia nervosa. Restrictive anorexia nervosa results in weight loss through restricting caloric intake, fasting, and exercising. Binge eating/purging anorexia nervosa results in weight loss by eating and then purging through self-induce vomiting, misuse of diuretics, laxatives, and enemas [31–34].

Bulimia nervosa

Most people who have bulimia nervosa are women in late adolescence or early adulthood. Those who have bulimia nervosa are most often white, but this disorder affects a wider socioeconomic stratum than anorexia nervosa. Maintaining normal weight is the single most distinguishing characteristic in differentiating anorexia nervosa from bulimia nervosa [34]. Four criteria are required to establish a diagnosis of bulimia nervosa: (1) eating in a discrete period of time (any 2-hour period) an amount of food that is definitely larger than most people would eat during a similar period of time or under similar circumstances; (2) consuming an abnormally large quantity of food rather than craving a specific food; (3) compensating using inappropriate behaviors to prevent weight gain; and (4) emphasizing body shape to an excessive and inappropriate extent [31–34].

Female athlete triad

Female adolescent athletes who become obsessed with body image and peak performance may progress beyond the systemic and oral manifestations of anorexia nervosa and bulimia nervosa. The female athlete triad is an even more devastating condition that includes an extended eating disorder combined with intensive athletic training, resulting in hormonal changes that lead ultimately to amenorrhea and premature osteoporosis [31–33].

Amenorrhea occurring after menarche in the female athlete triad is related to inadequate net caloric intake. If this situation remains unresolved, continued amenorrhea contributes to the onset of osteoporosis, with accompanying decrease in bone mass and increase in fracture risk—serious issues of concern for competitive female athletes [33]. Several questions remain unanswered regarding the implications of premature osteoporosis and alveolar bone loss.

The Adonis complex

For the eating disorders described in the preceding section, the body-image focus primarily affects adolescent girls and young women. Psychiatrists have only recently recognized and documented body-image disorders that have perhaps risen to epidemic levels among millions of contemporary boys and men [35]. These body-image disorders, termed the ''Adonis complex,'' range in severity from mild appearance concerns to obsessive behaviors that require psychiatric intervention [35].

Several clinical forms of the Adonis complex have been identified. Muscle dysmorphia is one form of the complex in which large and muscular bodybuilders mistakenly perceive themselves as small and frail. Many of these same individuals have secretly taken anabolic steroids to increase muscle mass. Paradoxically, they reported feeling even less secure about their size after taking the drugs. This aspect of the Adonis complex has been termed *reverse anorexia nervosa* [35].

Some men have become preoccupied with eliminating body fat rather than building muscle mass. A key element in this obsessive form of the complex is the secrecy surrounding the obsession. Another clinical form of the Adonis complex relates to men who become obsessed with the perceived ugliness or deformity of one or more of their body parts even though they are normal in appearance [35].

Much remains to be discovered about the causes, effects, and management of men exhibiting the characteristics of the Adonis complex.

Substance abuse

The expanding incentives for success in athletics have influenced male and female adolescents to participate in increasingly competitive sports at earlier ages. The potential for greater rewards and keener competition

have lured many of these individuals into risk-taking, substance-abuse behaviors, including some adolescent athletes who have sought to gain a competitive edge over their opponents through the illicit use performance-enhancing substances.

Alcohol

The recreational use of alcohol by adolescents reflects peer patterns that often begin as early as junior high school [36]. Highly involved athletes are more likely to drink excessively and to engage in more problem drinking behaviors than their nonathlete peers. The association between sports participation and alcohol consumption is primarily an issue for male adolescents [37].

Alcohol generally is not used by athletes to improve performance because its depressant effects are well known to impair judgment and motor skills. Some contestants in shooting events have used alcohol to decrease intrinsic tremor and improve accuracy [38].

Tobacco

The use of tobacco products is a behavior initiated with high frequency among adolescents of both sexes. For high school students, the odds of smoking cigarettes are lowered for those who participate in sports [37]. Conversely, the odds for chewing tobacco or dipping snuff are heightened for male and female high school athletes [37].

The use of smokeless tobacco products by athletes has been identified most traditionally with baseball or in weight classification sports such as wrestling [33,39,40]. Users of smokeless tobacco also include racecar drivers, rodeo performers, and rowers [33,41]. Women have also reported using smokeless tobacco products in sports such as gymnastics, field hockey, softball, and skiing [33].

Statistics from the National Collegiate Athletic Association disclosed that 10% of female college tennis players and 8% of female college track-and-field athletes used smokeless tobacco [33]. Nicotine, however, is not used to enhance performance but is used to stimulate the central nervous system (''the buzz'') to enhance alertness, suppress appetite, and relax skeletal muscles [34].

The emphatic message sent from members of the health care team to their adolescent patients who are athletes must be that smokeless tobacco is not a safe alternative to smoking cigarettes. Adolescent athletes need to be reminded early and often about the devastating, life-shortening systemic and oral consequences of using all forms of tobacco products [3].

Steroids

Fueled by the ambition for potential college scholarships and lucrative professional careers or the narcissism of the Adonis complex, adolescent athletes and nonathletes alike succumb to the allure of anabolic steroids

and other performance-enhancing substances. High school athletes are among the most vulnerable users of these illicit drugs [42].

Unlike alcohol or tobacco, anabolic steroids are used specifically to increase muscle mass, endurance, and strength to enhance appearance and athletic performance. Obtained through illegal sources, anabolic steroids, drugs that mimic the effects of testosterone, can lead to frightening side effects and premature death [42].

Paradoxically, the steroid-induced increase in muscle mass may actually stunt the ultimate growth of the developing adolescent athlete by shortening the period during which bone should be growing [43]. Thus, bone growth ceases prematurely, causing even greater stress on the tendons that attach the heavier muscle to bone that is less capable of providing that support.

During the past year, data indicate that more than 300,000 students between the eighth and twelfth grades used steroids illegally; of these students, one third were girls [44]. The transitory benefits of increased muscle mass, body build, and strength are a steep price to pay for risks that include aggressive/depressive personality changes, violent mood swings, paranoia, and suicide attempts. Other side effects of anabolic steroids include severe acne, male-pattern baldness, infertility, and male breast enlargement. In women athletes in sports such as track-and-field, swimming, body-building, and weight lifting, the side effects of anabolic steroids include growth of body and facial hair, deepened voice, enlargement of the clitoris, and menstrual cycle aberrations [33,42–45].

The extent of abuse of these substances at all levels (including professional and Olympic sports) has become an international outrage. The new federal antisteroid law of January 20, 2005 is one positive step to address this escalating epidemic. The law clarifies the definition of ''anabolic steroid'' to include tetrahydrogestrinone, prohormones, and steroid precursors including androstenedionel. Tetrahydrogestrinone is a so-called ''designer'' steroid because it was designed specifically to be undetectable using standard drug tests administered to athletes [44].

Legislation alone cannot address all of the ramifications of the problem. It will take a concerted effort from all factions involved to meet these challenges. The question remains: To what extent is society willing to continue to support problem risk-taking behaviors (and the eventual physical devastation) of athletes that enable them to achieve tainted levels of athletic performance?

Performance-enhancing substances

In addition to anabolic steroids, adolescent athletes may be enticed by other illicit performance-enhancing drugs and techniques [33].

Amphetamines

Amphetamines are central nervous system stimulants structurally related to epinephrine. These drugs increase mental alertness and sustain

performance while decreasing the perception of fatigue. Sport-specific uses include cycling, football, gymnastics, hockey, shot putting, and weight lifting. Amphetamines also are used by jockeys and wrestlers to suppress appetite [38,46].

Amphetamines alter cardiovascular cooling and predispose athletes to heat exhaustion. Other side effects include aggression, anorexia, cardiac arrhythmias, confusion, hypertension, restlessness, and tremors. Chronic use may result in psychologic dependency, attention-deficit disorder, and hyperactive disorder [46]. Deaths associated with the use of amphetamines have been reported [38].

Ephedrine

Ephedrine is another central nervous system stimulant that has properties similar to amphetamines. It is contained in some cold medications and herbal remedies [46].

Cocaine

Cocaine is an alkaloid related to alcohol and tobacco in its sympathomimetic stimulation of the central nervous system. Not only is it used to enhance performance but it has also become part of the lifestyle of some professional basketball and football players. The use of cocaine has been associated with local tissue damage, dependency, psychosocial disorders, and several sudden deaths [38].

Diuretics

Diuretics reduce body fluids through increased urination. The rapid weight loss desired by athletes in ballet, bodybuilding, boxing, crew, gymnastics, and wrestling may be accompanied by dehydration, ionic imbalance, and exhaustion [38].

β-Blockers

β-adrenergic blocking agents slow the heart rate and lower blood pressure. They calm the nerves in sports such as figure skating, ski jumping, and fencing; as well, they and steady the hands and increase accuracy in shooting sports such as archery and biathlon [38,46]. β-blockers are known to decrease an athlete's stamina [38].

Narcotics

Narcotics such as morphine and street drugs such as heroine mask pain in boxing, the martial arts, and wrestling. Because they mask pain, narcotics also increase the risk for overuse injuries, and their addicting properties place users at high risk for the serious consequences of an overdose [38].

The use of performance-enhancing substances, human growth hormones, and blood-doping techniques [33,38,46] are illegal and potentially life-threatening. Because most adolescent athletes obtain information about

these substances from sources other than health care providers [33,38,46], it becomes essential for those who provide adolescent athletes with emergent and routine treatment to be as knowledgeable as possible regarding these potential confounding factors.

Body art

The various forms of body art are not new. What may be amazing is the extent to which they have become accepted by ever-expanding segments of today's society. It should not be surprising that athletes who often thrive on the attention derived from participating in sports would also be attracted to self-expression through bodily adornments [33]. Although branding and tattooing are two popular and visible forms of body art (Fig. 2), the remainder of this article focuses its attention on tongue piercing, tongue splitting, and tooth jewelry.

Tongue piercing

Tongue jewelry has become one popular form of adornment within adolescent culture (Fig. 3). Although tongue piercing is most often viewed as a form of body art, it is in fact an unregulated surgical procedure with multiple intraoral, systemic, and life-threatening dangers—all of which have been well documented in dental and medical literature [33,47,48].

Typically, tongue piercing is performed without local anesthesia in tattoo parlors or piercing salons by unlicensed personnel who have limited training. The proper knowledge base or sterile technique cannot be assured. Issues related to informed consent by parents for tongue piercing of minors in these establishments have been raised [48,49]. Alternatively, teens frequently allow peers to perform the piercing at parties or rock concerts.

Most sports-governing agencies have enacted regulations that prohibit athletes from wearing tongue jewelry during practice and in competition;

Fig. 2. Tattoos are a common form of body art among athletes in college football.

Fig. 3. Pierced tongue jewelry in a female college basketball player who was receiving orthodontic treatment. Note the discoloration of tooth 8. During a game, the player received an elbow from an opponent. Tooth 8 was extruded and nearly avulsed by the force had it not been for the orthodontic arch wire that held it in the socket. The tooth was repositioned and stabilized within 15 minutes of the trauma.

however, athletes are reluctant to remove the tongue jewelry because the pierced site, usually in the midline of the tongue, is prone to close with tissue in a relatively short time. To avoid closure of the site, athletes temporarily replace the metal tongue jewelry with a clear plastic stud to avoid detection by team trainers or game officials.

Health care providers are encouraged to advise their patients to avoid having the tongue pierced, to be prepared to address postpiercing problems, and to encourage state and federal agencies to enact appropriate legislation for the multiple health and safety risks surrounding this practice [33,48,49].

Tongue splitting

An even more recent and radical practice is splitting or forking of the tongue lengthwise in the midline to create two halves that mimic the tongue of a serpent. In untrained hands, the dangers of such a practice predictably are beyond those described earlier for tongue piercing. Some states, such as Illinois, have enacted laws that ban this practice except by a licensed medical or dental practitioner and only on a therapeutic or clinical basis for that patient [50].

Tooth jewelry

Adornment of the teeth is an ancient practice dating back to the Mayan culture of ninth-century Mexico. Skeletal specimens from that era demonstrate anterior teeth that have been prepared and adorned with jade and turquoise inlays [51].

In the more recent past, the emphasis placed on cosmetic and esthetic dentistry evolved from the initial generation of composite resin materials. Before the introduction of the acid-etch enamel composite-resin restoration

technique, fractured anterior teeth in young adolescent patients were restored routinely with nonesthetic stainless steel crowns. In an attempt to improve esthetics, some practitioners cut labial windows into the stainless steel crown and filled the void with silicate cement or one of the first-generation composite filling materials (Fig. 4).

In the current era of cosmetic and esthetic emphasis, restorations are sculpted beautifully with any number of sophisticated composite layering systems that include literally dozens of shades that add depth, luster, and character to restore the tooth to an esthetically natural quality.

It is ironic to note that in this era of cosmetic and esthetic emphasis, one of the latest fads in tooth jewelry appears amazingly similar to the stainless steel crowns that were once considered nonesthetic (Fig. 5). Again, the adage ''beauty is in the eye of the beholder'' holds true in the current culture.

How health professionals can influence adolescent athletes

Peer pressure is decidedly prevalent among adolescent athletes in organized sports [52]. During the highly impressionable teen through young adult years, an athlete is exposed to many choices that can affect his or her health—positively and negatively [52]. Athletes may be exposed to risks such as poor nutrition, substance abuse, body art, or refusal to wear protective gear during practices and games.

Although many of these choices are influenced by peers, coaches, parents, and professional athletes, health professionals should also be in tune with their patients to determine whether there are signs of unhealthful behavior. Dental professionals may be some of the most frequently seen health professionals that adolescents encounter, with appointments as often as every 6 months or less.

When confronting young athletes, health professionals should encourage their patients to begin thinking about why they make certain decisions. For

Fig. 4. An adolescent patient's stainless steel crown with an ''esthetic'' labial window to restore an enamel-dentin crown fracture on tooth 8.

Fig. 5. The crown on tooth 10 was not prepared before placement of this removable piece of tooth jewelry on a college football player. Note the similarity between this crown considered an art form compared with the previous figure in which the crown on tooth 8 to restore a fracture was considered functional but not esthetic.

instance, a common problem dentists may come across with young athletes is the awareness that he or she is not wearing a mouthguard while participating in sports. There are many reasons athletes dislike wearing mouthguards, such as discomfort, the inability to communicate with one another, fear of being ridiculed by their peers, or the fact that professional athletes whom they admire do not wear them. Educating athletes about the health risks of their behaviors and encouraging a long-term behavior change helps them to realize the best and proper decision on their own.

Although peer pressure is often thought of as a negative influence by one's peers, sports can also present peer pressure in a positive form [53]. Coaches, health professionals, teammates, and team leaders have an ability to help build an athlete's self-esteem. Through education and positive reinforcement, an athlete develops courage, strength, and a positive self-image to make smart, healthful choices on his or her own.

For more information about peer pressure and risky behavior among young athletes, visit the following Web sites: http://www.aaasponline.org, http://www.ncaa.com, http://www.nstep.org, and http://sportsmedicine.upmc.com/MentalTrainingProgram.htm.

Summary

Education is one of the primary methods of intercepting or preventing risky behaviors among adolescent athletes. It is important for health professionals to create awareness and understanding among their colleagues about some of the issues affecting these young athletes, such as sports-related injuries, unhealthful nutritional practices, substance abuse, and body art. This knowledge can be passed along to patients who may be influenced to

avoid unnecessary risks and improve their health and safety while participating in sports.

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