[GUEST EDITORIAL]

Did the NFL Lockout Expose the Achilles Heel of Competitive Sports?

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Over the past few months we have been afforded a unique opportunity to evaluate injury rate data prior to, during, and following the historical aberration created by the recent National Football League (NFL) Lockout. During this period (March 11th to July 25th, 2011), professional football players underwent an uncommon offseason, without the normal access to their team's healthcare providers, strength and conditioning professionals, and high-level coaches. With limited access to these professionals and an absence of the structured preseason preparatory conditioning normally progressed over a 14-week period between May and July, we had a unique window of opportunity to evaluate the effects of an alarmingly rapid transition (a mere 17 days) from the start of training camp (July 27th), which took place 2 days after the end of the Lockout, to the initiation of preseason competition (August 11th).

A glimpse at early data, limited to Achilles tendon injuries, is cause for concern due to an unprecedented number of Achilles tendon ruptures in training camp and the beginning of preseason. Unfortunately, these injuries likely represent career-altering and often career-ending events for professional athletes, as one third of the players who sustain an Achilles tendon rupture in the NFL never return back to competition.[19] The remaining two thirds, who are able to return back to play in the NFL following Achilles tendon repair, require approximately 11 months of rehabilitation.[19] Moreover, these returning players experience a greater than 50% reduction in their power ratings, which is a measure of performance using statistics gathered during game play (eg, passing and rushing yards for an offensive player and tackles and interceptions for a defensive player).[19]

To put this year's data into context, we need to first consider historical data related to the incidence of Achilles tendon ruptures in the NFL. Data from a prior report covering 20 NFL seasons (1980 to 2001) indicated an average of approximately 4 Achilles tendon ruptures per year that required surgical intervention.[7] Parekh and colleagues[19] monitored the 1997 to 2002 seasons and recently reported that, when including preseason and in-season injury data, Achilles tendon ruptures occurred at an average rate of 5 per year. According to Dr Elliott Hershman, Director of Orthopedics at Lenox Hill Hospital in New York and Chairman of the NFL's Injury and Safety Committee, "On average, there are 8 Achilles tears in a full season."[1] This average is consistent with more recent reports of 6 and 10 Achilles tendon ruptures during

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the 2008-2009 and 2010-2011 seasons, respectively.[2,6]

This year, following the rapid transition to training camp and preseason practice from the NFL Lockout, 10 Achilles tendon injuries occurred over the first 12 days of training camp, with 2 additional injuries occurring in the subsequent 17 days, which included the first 2 weeks of preseason competition (**FIGURE**).[2,6] To further put these numbers in perspective, we have to consider that of the 31 Achilles tendon ruptures that occurred for the entire period between 1997 and 2002 in the NFL, 35% occurred during the preseason and the remaining 65% occurred during games in the regular season.[19] Based on these data, we would expect between 1 and 3 Achilles tendon injuries during the 6 weeks that included training camp and preseason. While it is noted that the preseason rosters were increased from 80 to 90 players this year, this 12.5% increase in the number of players cannot fully account for a 4-fold increase (from 3 to 12) Achilles tendon ruptures in the preseason. Regardless of the previous data that are used, the number of Achilles tendon ruptures in NFL players this year (15 days of training camp and 2 weeks of preseason) has already exceeded all previously reported numbers of Achilles tendon ruptures that normally occur over an entire NFL season.

The recent NFL Lockout has also created a unique perspective to evaluate the rapid transition of younger players in the NFL into high-level structured practice and conditioning without regular preparatory training sessions that provide the needed opportunity to gradually adapt to the rigors of NFL training. If this historic NFL Lockout was the "tipping point" between the absence of adequate player preparation and an increase in preseason injuries, one might expect the effect to be more pronounced in rookies as opposed to veteran NFL players who are more familiar with the rigors of training camp and better positioned financially and experientially to prepare themselves for the upcoming season.

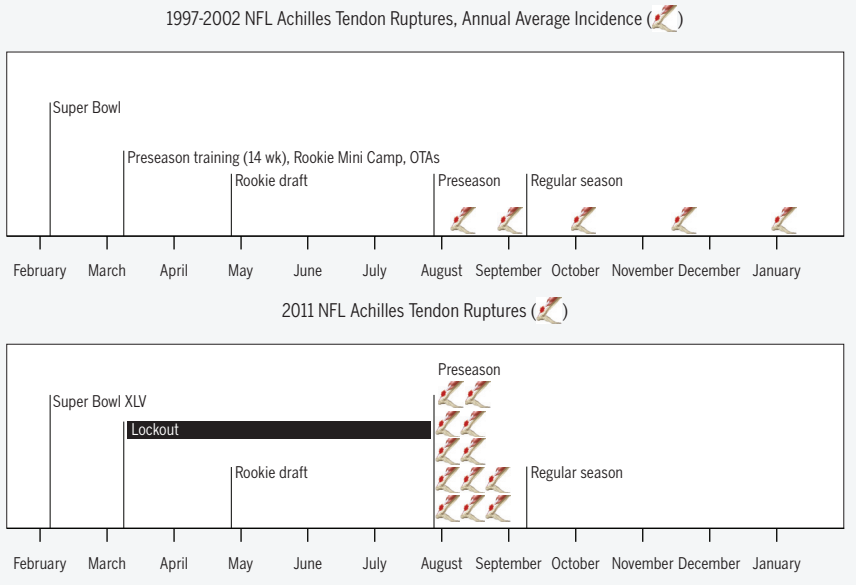

FIGURE. Between the 1997 and 2002 NFL seasons, 31 Achilles tendon ruptures were recorded, for an average of 5 per year.[19] Thirty-five percent of these ruptures occurred during the preseason, and 65% occurred during games in the regular season and were equally distributed throughout the season. In the current year (2011), there were 2 Achilles ruptures (not depicted) in the time-frame between Super Bowl XLV and the end of the 2011 Lockout period. In the first 12 days of Training Camp following the Lockout period, there were 10 reported Achilles ruptures and 2 more occurred in the first 2 weeks of preseason. Abbreviation: OTA, organized team activity.

On average, the 31 NFL players who sustained an Achilles tendon rupture during the 1997 to 2002 NFL seasons (which included standard preseason training) had been in the league for approximately 6 years (range, 0-14 years).[19] Based on these data, Parekh et al[19] speculated that an Achilles tendon rupture is "an injury of veteran NFL players" and would not be as prevalent in younger players. Interestingly, of the 10 Achilles tendon ruptures reported in the first 12 days of the 2011 post-Lockout training camp, 5 of these injuries occurred in rookies, and the average NFL experience for all 12 players with preseason Achilles tendon ruptures (up to date of this submission) was only 1.4 years. Parekh et al[19] also reported that the average age of NFL players at the time of an Achilles tendon rupture was 29 years (range, 23-36 years), which was older than the average age of all players in the NFL (26.5 years).[19] This year the average age of the NFL players who sustained an Achilles tendon rupture was 23.9 years (range, 21-29 years).

In the midst of the discussion on high-risk professional athletics and sports-related injuries, it is important to consider the amount of player contact time with team staff. A disturbing new amendment to the updated NFL labor agreement is that team-supervised offseason conditioning will be reduced by 5 weeks. Therefore, organized team activities are now capped at 9 weeks compared to the allowed maximum of 14 weeks on previous agreements.[16,17] Historically, team contact time that focused on preparatory conditioning has been reduced in sequential labor contracts.[15-17] This reduced time almost certainly decreases opportunities for players to interact with medical staff and the team's strength and conditioning professionals. In addition, shortened coaching time may influence NFL coaches to get more done in less time by increasing the intensity, volume, and frequency of training to complete the necessary predetermined plays,

tactics, and training before the season starts. Ironically, NFL players are the ones who have negotiated on sequential labor agreements to reduce the amount of preseason contact time with team physicians, coaches, physical therapists, certified athletic trainers, and strength and conditioning coaches, which limits safe progression into sports competition and may, therefore, increase the risk of sport-related injuries.[1,7,19]

Another consequence of the 2011 NFL Lockout may be an increase in relative reinjury risk during early sports reintegration, due to greater residual biomechanical and neuromuscular deficits from prior injuries or surgeries sustained in previous years.[3,8,18,20] The "release for full activity" is a potentially sensitive landmark for the athlete who has a strong desire to return to immediate high-level sports participation.[12] During standard NFL preseason rehabilitation, the sports medicine team and strength and conditioning staff work together with the athlete to bridge the potential gap between the athletes' perceived versus actual sports readiness. This bridge is especially significant as subjective scores often do not correlate with quantified function and strength scores in athletes with severe injury and postsurgery.[14,21]

The recent NFL Lockout likely limited the potential for athletes to fully rehabilitate from injuries incurred in previous seasons. We have shown that there are measurable functional deficits in athletes following surgical anterior cruciate ligament reconstructions after return to sport that are sustained up to 11 months after surgery.[13] While athletes may be prepared to begin sports-specific training for practice and competition, they typically demonstrate lingering deficits, that are not self-perceived and limit their potential for safe integration into full competition. Time will tell if there is an increase in reinjury occurrences in NFL athletes who sustained an injury in the past but were not fully rehabilitated during the Lockout.

Athletes at every level of play, from Pop Warner football to the NFL, need to be prepared for the demands of sports practice and competition to reduce their risk of injury and enhance athleticism. Aspiring young athletes who do not have the enhanced physical prowess and necessary neuromuscular control are at increased risk of injury, as evidenced by epidemiological reports on anterior cruciate ligament injuries in adolescent athletes.[8] Exercise deficit disorder is a term we use to describe a condition in children characterized by reduced levels of physical activity that are inconsistent with positive health outcomes.[4] In the same vein, the worrisome rash of injuries following the period of relative "inactivity" driven by the recent historic NFL Lockout may be reflective of a similar condition in athletes. What has previously been described in a vague manner as being "out of shape" might be viewed as a deficit characterized by reduced levels of preparatory conditioning that are inconsistent with long-term health and safe integration into the demands of competitive sport.

If this recent Lockout scenario in the NFL continues to result in a demonstrable increase in injuries in professional football players, it may have significant implications for healthcare providers, school administrators, and youth coaches, who must consider the potential impact on our middle school and high school athletes. Integrative strength and conditioning programs are becoming recognized as a necessary component to help ensure safe sport participation in youth.[10,11] Due to the demonstrable positive effects of a priori injury prevention training, this type of preparatory conditioning is indicated for inclusion in a comprehensive preseason program for all aspiring young athletes. The importance of preseason training has been further highlighted by the Centers for Disease Control and colleagues.[5] Based on their dataset, it is clear that preseason training results in increased athlete safety during the first half of the competitive season. A positive dose-response relationship has been demonstrated, and a minimum of 6 to 8 weeks of training appeared necessary for induction of positive changes toward enhanced injury prevention profiles.[9,22]

While the total elimination of sports-related injuries is an unrealistic goal, appropriately designed and sensibly progressed preseason neuromuscular training and conditioning, with ready access to sports medicine professionals and qualified strength and conditioning coaches, may help reduce the likelihood of sports-related injuries in all athletes. If risk factors associated with sport injuries are properly addressed (eg, low fitness level, muscle imbalances, neuromuscular deficits, and errors in training), both acute and overuse injuries can be reduced.

As the 2011-2012 NFL season is now in full swing, it is troubling to think of the players who may not have been physically prepared for the demands of professional football or those who were unable to fully recover from lingering neuromuscular deficits. Will this post-Lockout competitive season continue to show an alarming number of career-ending injuries and lost dreams? This may be a record-breaking NFL season for all the wrong reasons.

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