

# Professional Soccer Players' Return to Play and Performance After Operative Repair of Achilles Tendon Rupture

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**Background:** The majority of Achilles tendon ruptures are sports related; however, no investigation has examined the impact of surgical repair for complete ruptures on professional soccer players.

**Purpose:** To examine the return to play, playing time, and performance of professional soccer players following Achilles tendon repair.

**Study Design:** Cohort study; Level of evidence, 3.

**Methods:** Union of European Football Associations (UEFA) and Major League Soccer (MLS) athletes who sustained a primary complete Achilles tendon rupture and were treated surgically between 1988 and 2014 were identified via public injury reports. Demographic information and performance-related statistics for the identified athletes were recorded for the season before surgery and 2 seasons after surgery and were compared with information for matched controls. Statistical analyses were used to assess differences in recorded metrics.

**Results:** A total of 24 athletes with Achilles ruptures met inclusion criteria, 17 (70.8%) of whom were able to return to play. On average, players had 8.3 years of professional-level experience prior to sustaining an Achilles rupture. Among athletes who returned to play, no differences were found in the number of games played or started, minutes played, or goals scored 1 year postoperatively compared with the year prior to injury. However, 2 years postoperatively, these athletes played 28.3% ( $P = .028$ ) fewer minutes compared with their preoperative season, despite starting and playing in an equivalent number of games. Matched controls had baseline playing time and performance statistics similar to those of players. However, controls played and started in significantly more games and played more minutes at 1 and 2 years compared with players ( $P < .05$ ). No differences were found in goals scored at any time point.

**Conclusion:** This is the first investigation examining the effect of an Achilles repair on the career of professional soccer players. This is a difficult injury that most commonly occurs in veteran players and prevents 29.2% of players from returning to play despite surgical management. Additionally, athletes able to return to play were found to play fewer minutes 2 years postoperatively compared with their baseline as well as playing less at 1 and 2 years postoperatively compared with uninjured matched controls. The reduction in playing time following an Achilles repair has significant implications for professional players and teams.

**Keywords:** soccer; Achilles tendon; Achilles repair; return to play; Union of European Football Associations; Major League Soccer

Soccer is among the most popular sports in the world, being played by more than 200 million people.<sup>9</sup> It is also one of the fastest growing sports in the United States, where 20 million players are registered and 1 million play competitively.<sup>8,22</sup> As participation in soccer continues to increase, injury rates can be expected to follow a similar trend. Although injury incidence within the literatures varies widely, some investigators have reported that the match injury incidence is as high as 30 per 1000 hours of exposure while the training injury incidence is lower, at 5 per 1000

hours of exposure.<sup>11</sup> Not unexpectedly, the majority of severe soccer injuries, 60% to 80%, occur in the lower extremity.<sup>1,5</sup> Although numerous investigations have been conducted regarding anterior cruciate ligament (ACL) ruptures, hamstring and adductor strains, and ankle ligament injuries in professional soccer players, limited information is available regarding Achilles tendon ruptures in this patient population.<sup>5-8,17</sup>

Rupture of the Achilles tendon requires 2 pathologic processes: tendinosis, or a focus of degeneration within the tendon, and an eccentric contracture of sufficient force to rupture the diseased tendon.<sup>4</sup> These injuries are more common in men, typically affect the “weekend warrior,” have an incidence in the general population ranging from 8.3 to

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24 per 100,000, and have been found to increase in frequency over time.<sup>12-14,19,29</sup> Furthermore, a recent systematic review found that an average 80% of patients are able to return to play (RTP) at a mean of 6.0 months following an Achilles tendon rupture.<sup>4,31</sup> The majority of Achilles tendon ruptures are sports related, and while the optimal treatment for Achilles ruptures continues to be debated, some authors have advocated surgical repair in elite athletes.<sup>15,18,26</sup>

Outcomes, particularly RTP, following numerous orthopaedic injuries and procedures have been documented in a number of professional athletes in the National Basketball Association (NBA), National Football League (NFL), Major League Baseball (MLB), and National Hockey League (NHL).<sup>2,3,21,25,27</sup> Trofa et al<sup>30</sup> showed that athletes in these leagues experienced a 30.6% rate of failure to RTP following an Achilles rupture treated surgically and that all performance outcomes measured were significantly affected compared with preinjury levels. Thus, despite near-limitless resources to help facilitate appropriate rehabilitation, an Achilles rupture can be a career-threatening injury among elite athletes. However, a similar investigation has not been performed in elite soccer players. The purpose of the current investigation was to determine the RTP rate and functional outcomes of professional soccer players after a primary Achilles tendon repair. The hypothesis was that a significant proportion of athletes would not RTP following repair and that various performance measures would be significantly impaired compared with preinjury baselines and matched controls 1 and 2 years after surgery.

## METHODS

Publicly available injury reports, press releases, and player profiles were accessed to yield a list of professional athletes in the Union of European Football Associations (UEFA) and Major League Soccer (MLS) who sustained a primary complete Achilles tendon rupture and subsequently underwent surgical repair between 1988 and 2014. This information was obtained from such sources as [www.transfermarket.com](http://www.transfermarket.com), [www.espn.com](http://www.espn.com), [www.eufa.com](http://www.eufa.com), [www.mlssoccer.com](http://www.mlssoccer.com), and individual team websites. Inclusion criteria for athletes required professional participation in at least 1 game for the season prior to rupture and no confounding injuries. Goalkeepers were excluded because the different roles between these athletes and field players would not allow a fair comparison.

Two matched controls were subsequently selected for all players who returned to play. To match athletes who met the inclusion criteria of the study and controls, a stratified

search was performed. First, players within the same league as the injured athlete were collected. Second, those uninjured athletes who did not play the same position as the injured athlete at the time of their injury were eliminated. Third, uninjured athletes who had not played in professional soccer for at least as many years as injured athletes at the time of their injury were eliminated. Finally, if more than 2 potential controls remained after this stratification, then the 2 athletes with the most similar playing statistics to the injured athlete were chosen as controls. Playing statistics assessed included number of games played, playing time, games started, and goals scored. Professional leagues were included in the matching criteria in order to eliminate variations in length of regular season soccer between leagues of different countries and to alleviate variations in player skill across different leagues within the same country. Controls were also verified to have no history of significant lower extremity injury or surgical treatments.

Online databases and publicly available sports statistics websites were mined to find demographic, playing time, and performance-related data for players and controls. Demographic information obtained included age, body mass index, years of professional league experience, and position. The primary outcome of the investigation was RTP following surgical treatment of an Achilles tendon rupture. A strict definition of RTP was implemented, requiring involvement in at least 1 game for 2 consecutive years, ensuring sustained professional level play. Secondary outcomes included comparisons of preoperative versus postoperative playing time, as measured by the number of games played and minutes played; and performance, assessed by the number of games started and goals scored. For injured players, the season prior to which injury and surgical repair occurred was considered to be the index season. Statistics of interest as outlined above were recorded for the index season and 1 and 2 years following surgery. The same measurements were recorded in matched controls, and the index season was defined as the year in which the athlete had participated in an equal number of seasons as the matched player's index season. As such, the index seasons for players and controls were not required to be from the same calendar year.

Statistical analyses were conducted via PRISM version 7.0b (GraphPad Software). Preinjury versus postinjury performance was compared in players with Achilles tendon rupture through use of a 2-tailed paired *t* test, and comparisons between athletes with Achilles tendon rupture and matched controls were performed with 2-tailed unpaired *t* tests.

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Ethical approval was not sought for the present study.

TABLE 1  
Demographic and Baseline Characteristics of Players  
and Controls at their Respective Index Seasons<sup>a</sup>

	Players	Controls	P Value
Age, y	28.2 ± 2.8	27.6 ± 3.7	.53
Body mass index, kg/m <sup>2</sup>	24.1 ± 1.9	23.3 ± 1.6	.14
No. of professional seasons	8.3 ± 3.8	7.8 ± 3.2	.65
Position, n			
Defense	4	8	
Midfield	11	22	
Forward	2	4	
No. of games played	27.9 ± 7.8	27.1 ± 8.1	.72
Minutes played	2112 ± 785	2137 ± 840	.92
No. of games started	22.2 ± 10.4	24.0 ± 9.7	.56
No. of goals scored	4.8 ± 6.1	4.8 ± 7.0	>.99

<sup>a</sup>Values are expressed as mean ± SD except for playing position.

TABLE 2  
Comparison of Index Versus 1-Year and 2-Year  
Postoperative Playing Time and Performance in Players<sup>a</sup>

Index	1 Year Postoperative (P value)	2 Years Postoperative (P value)
Games played	27.9 ± 7.8	22.9 ± 9.9 (.114)
Minutes played	2112 ± 785	1679 ± 797 (.148)
Games started	22.2 ± 10.4	19.2 ± 10.7 (.317)
Goals scored	4.8 ± 6.1	3.3 ± 3.4 (.187)

<sup>a</sup>Values are expressed as mean ± SD.

<sup>b</sup>Statistically significant difference compared with index year ( $P < .05$ ).

## RESULTS

Overall, 29 athletes were identified as sustaining an Achilles tendon rupture, of whom 24 met inclusion criteria. Reasons for exclusion included partial Achilles tear ( $n = 2$ ), goalkeeper position ( $n = 1$ ), and confounding injury ( $n = 2$ ). Seven (29.2%) of the remaining athletes did not RTP in the 2 seasons following surgery. The 17 athletes who returned consisted of 1 MLS player and 16 UEFA players, and their demographic and baseline characteristics can be seen in Table 1. Although the mean age of players not returning to play was higher than those able to return, it was not significantly different (30.1 vs 28.2 years;  $P = .31$ ). Returning athletes had an average 8.3 (range, 2-17) seasons of professional soccer experience (Table 1), and the majority of players were midfielders (64.7%).

Among athletes returning to play, no significant decreases in playing time or performance in the season following surgery compared with the index season were seen (Table 2 and Figure 1). At 2 years postoperatively, athletes played an average of 78.1% of the games and 71.7% of the

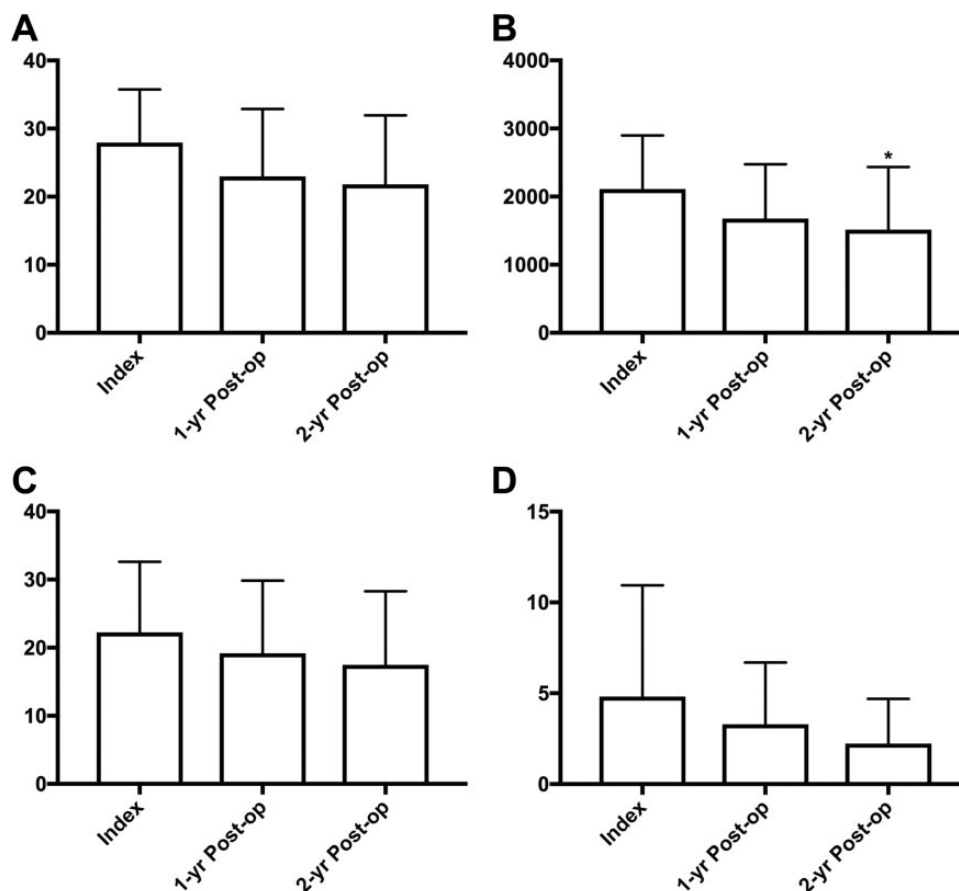
minutes played in the season prior to injury, but only the reduction in minutes played was found to be significant ( $P = .028$ ). The proportion of games started and goal scores also decreased 2 years postoperatively, 78.8% and 45.8%, respectively; however, these differences were not significant.

Two matched controls were identified for each injured player. No baseline differences were found at any parameter examined between each group's respective index season (Table 1). Additionally, no differences were found in any outcome measure compared between the index season and postoperative season 1 or 2 among controls. Despite this, playing time and performance measures were significantly compromised among players compared with controls postoperatively (Table 3, Figures 2 and 3). At 1 year postoperatively, injured players participated in 24.2% fewer games ( $P = .003$ ), played 30.6% fewer minutes ( $P = .001$ ), and started in 29.9% fewer games ( $P = .003$ ) compared with controls. This trend continued 2 years postoperatively, where players participated in 21.0% fewer games ( $P = .025$ ), played 29.5% fewer minutes ( $P = .015$ ), and started in 27.4% fewer games ( $P = .030$ ). No significant differences were identified in the number of goals scored.

## DISCUSSION

Successful repair of an Achilles tendon in the general population is measured by return to daily activities, including various levels of athletic participation, as well as the avoidance of complications such as rerupture and wound breakdown. These goals are adjusted in elite athletes given the high physical demands of their profession, where the goal of surgery is to RTP at a level equivalent to their preinjury performance or that of matched controls. As such, the success of an Achilles repair in this population requires increased objective scrutiny of various performance metrics, which can be difficult in a low-scoring sport such as soccer. The current case-control investigation of professional soccer players undergoing an Achilles tendon repair demonstrated a 70.8% RTP rate. These players not only returned to sport postoperatively but successfully competed for 2 years following their injury, ensuring sustained functional capacity to play.

To our knowledge, this is the first assessment of professional soccer players undergoing Achilles tendon repair. Previous literature has demonstrated that an Achilles tendon rupture can be detrimental to a professional athlete's career. For example, RTP rates in NFL and NBA players have been found to be 68% to 73% and 61% to 71%, respectively.<sup>2,20,23,24</sup> More specifically, Trofa et al<sup>30</sup> recently performed an investigation of Achilles tendon ruptures among NFL, NBA, and MLB athletes, finding RTP rates of 66%, 68%, and 100%, respectively. The same investigation found that compared with controls, only 1-year postoperative performance metrics were significantly affected. This stands in contrast to soccer players treated for Achilles tendon ruptures, as they were unable to continue playing the same amount of time or to perform at a level



**Figure 1.** Index versus 1-year and 2-year postoperative comparisons of (A) games played, (B) minutes played, (C) games started, and (D) goals scored among professional soccer players sustaining an Achilles rupture. \* $P < .05$  compared with index year.

**TABLE 3**  
Postoperative Comparisons of Playing Time and Performance Between Players and Controls<sup>a</sup>

	1 Year Postoperatively			2 Years Postoperatively		
	Players	Controls	<i>P</i> Value	Players	Controls	<i>P</i> Value
Games played	22.9 ± 9.9	30.2 ± 6.4	.003 <sup>b</sup>	21.8 ± 10.1	27.6 ± 7.4	.025 <sup>b</sup>
Minutes played	1679 ± 797	2421 ± 682	.001 <sup>b</sup>	1514 ± 876	2148 ± 806	.015 <sup>b</sup>
Games started	19.2 ± 10.7	27.4 ± 7.6	.003 <sup>b</sup>	17.5 ± 10.8	24.1 ± 9.4	.030 <sup>b</sup>
Goals scored	3.3 ± 3.4	4.8 ± 5.7	.326	2.2 ± 2.5	3.7 ± 3.8	.172

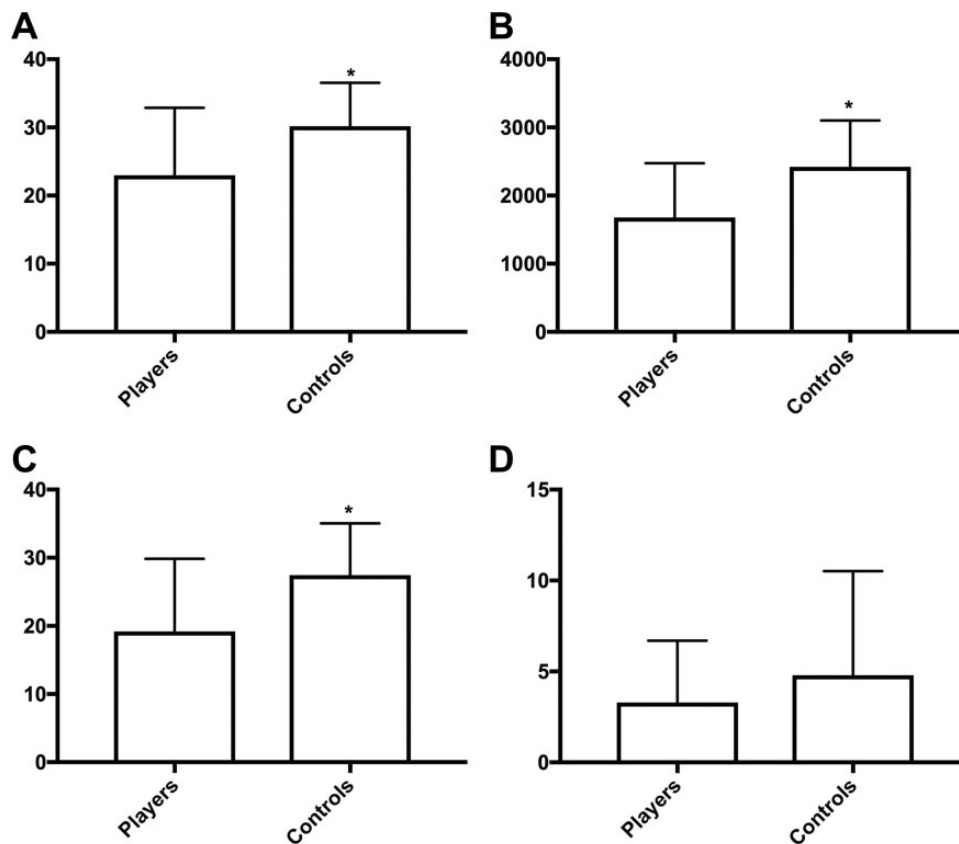
<sup>a</sup>Values are expressed as mean ± SD.

<sup>b</sup>Statistically significant difference between groups ( $P < .05$ ).

commensurate with uninjured controls at both 1 and 2 years following surgery.

Despite performing worse than controls postoperatively, players did not have statistically impaired performance measures compared with their own index season. In fact, the only significant variable identified was a 28.3% reduction in minutes played 2 years postoperatively compared with the index season. This indicates that although players may have started and played in an equivalent number of games, they were either removed from the game earlier or substituted into the game later, possibly as a

result of fatigue or poorer performance. However, it is important to note the vital difference between statistically significant results and what is important in the life of a recovering athlete. For instance, on average, players started and played in 13.5% and 17.9% fewer games, respectively, 1 year after surgery, and in 21.2% and 21.9% fewer games, respectively, the following year. Given that the ability to continue playing soccer at a high level determines players' livelihood, such limitations are detrimental to professional players in ways researchers are simply unable to measure. Finally, it is worth noting that

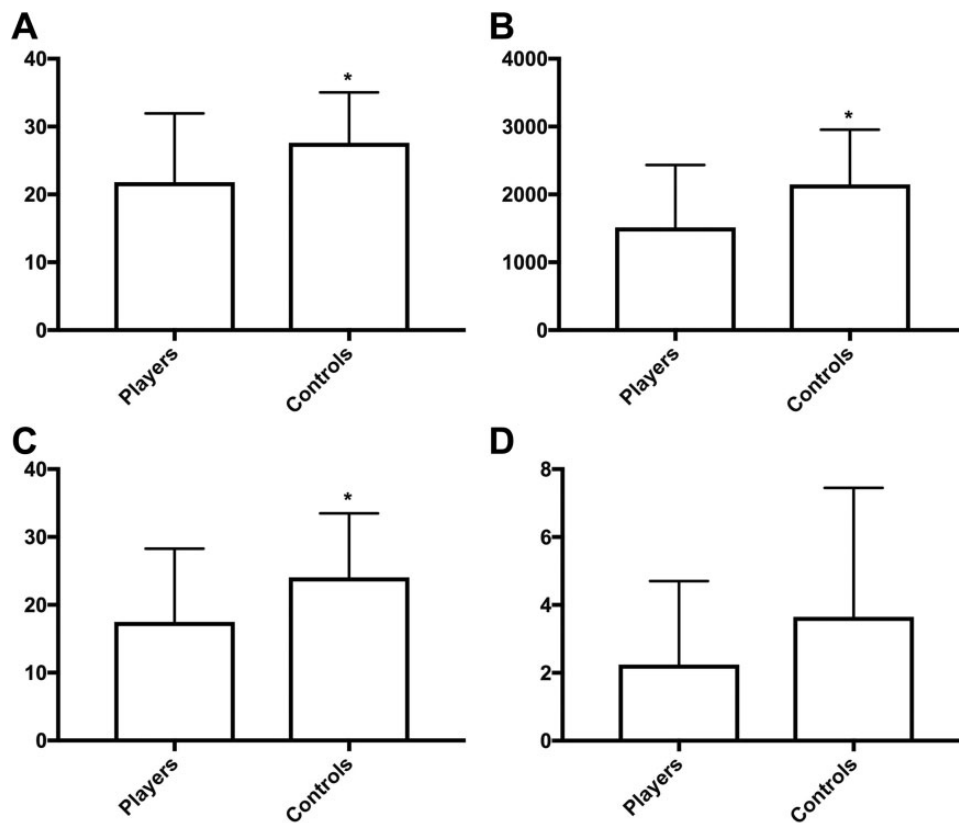


**Figure 2.** One-year postoperative comparison of (A) games played, (B) minutes played, (C) games started, and (D) goals scored among professional soccer players sustaining an Achilles rupture and matched controls. \* $P < .05$  between groups.

because control players continued to have a consistent amount of playing time over the course of the study, the decrease in minutes played among players with Achilles repairs is more likely a result of their injury as opposed to the natural aging process.

Various investigators have looked at the epidemiological patterns and/or treatment of other musculoskeletal injuries in soccer players.<sup>5-8,17,28</sup> Studies that have specifically evaluated postinjury RTP and performance among elite players have focused on ACL reconstruction, ankle syndesmotic injuries, and the arthroscopic treatment of femoroacetabular impingement (FAI).<sup>7,8,16</sup> A number of interesting comparisons can be made between these studies and the current investigation. For instance, an Achilles tendon rupture is an injury of veteran players.<sup>10</sup> In our player cohort, the average age at the time of injury was 28.2 years, with an average 8.3 years of professional level of play. These data stand in contrast to investigations by Erickson et al,<sup>7</sup> who reported that professional soccer players undergoing ACL reconstruction were on average 25.6 years old, and Locks et al,<sup>16</sup> who noted that players with FAI underwent surgery at an average age of 25.0 years. The older age of patients sustaining Achilles tendon ruptures may, in part, explain the lower RTP rate compared with players recovering from both ACL reconstruction (77%) and FAI surgery (96%).

Additionally, an Achilles tendon rupture is a comparatively uncommon injury among professional soccer players. For example, between 1996 and 2012, a total of 52 professional players in a single league were identified with ACL ruptures, and in a single-surgeon series between 2005 and 2015, there were 24 professional players treated surgically for FAI.<sup>7,16</sup> In the current investigation, after searching multiple leagues, we identified only 24 players who fit the inclusion criteria, which was a surprisingly low number given the overall number of professional soccer athletes. We hypothesize that this is a reflection of the pathologic process necessary to sustain an Achilles rupture, in that there must be underlying tendinosis in addition to an eccentric contracture to fully rupture the tendon. This tendinosis is likely more common in slightly older players. Also, given that tendinosis is a necessary precursor, many team physicians and trainers may aggressively address any tendinosis, thereby minimizing the risk of tendon rupture. Support for this argument comes from an 11-year epidemiological study on Achilles-related injuries in the UEFA, in which the 205 Achilles tendon injuries identified accounted for only 2.5% of all recorded injuries; however, 96% of these were tendinopathies.<sup>10</sup> Finally, to our knowledge, only 1 other soccer investigation has compared postsurgical outcomes relative to controls. In that investigation, Erickson et al<sup>7</sup> found that players treated for an ACL reconstruction



**Figure 3.** Two-year postoperative comparison of (A) games played, (B) minutes played, (C) games started, and (D) goals scored among professional soccer players sustaining an Achilles rupture and matched controls. \* $P < .05$  between groups.

played in significantly fewer games and took fewer total shots and shots on goal. The current investigation identified similarly impaired performances following an Achilles tendon repair compared with controls.

The strengths of this investigation include the use of simple and reproducible outcome variables. Furthermore, a strict definition of RTP was implemented, ensuring a sustained return to professional involvement for a minimum of 2 years. Finally, this is the first investigation of its kind to compare postoperative playing time and performance in professional soccer players after Achilles repair versus matched controls.

Despite these strengths, the investigation has certain limitations. First, a number of confounding variables could not be controlled by our method and may have affected a player's calculated RTP and performance. These include differences in team playing style, coaching decisions, concomitant minor or unreported injuries that were not identified, athletes' personal or professional decisions for retirement unrelated to medical conditions, and selection bias where more popular or well-known players were more easily identified for inclusion. Further, since the majority of data obtained in this investigation were from publicly accessible websites, no method was available to verify the accuracy or completeness of the available data. As such, given the low number of Achilles tendon ruptures identified, it is likely that the true incidence was underreported

in this investigation. Additionally, over the period of time during which these data were collected, treatment paradigms changed significantly with regard to both surgical treatment and rehabilitation in a way that this investigation could not take into account, as we had no clinical data on these patients. The study design could also not account for various factors that may have affected recovery as well as the ability of players to RTP, including repair technique, use of augmentation, unreported complications, or individual rehabilitation protocols. In the same regard, the method of the investigation did not permit an analysis of other factors that may have influenced the players' RTP rate, including contract timing, marketing factors, leadership positions, or personal decisions. Finally, Achilles tendon ruptures are rare injuries in this patient population, and the relatively small number of players identified for analysis may have limited the power of this investigation.

## CONCLUSION

Across multiple professional soccer leagues, we found a 29.2% failure rate for RTP following an Achilles rupture treated surgically. Furthermore, those athletes who returned to play played significantly less compared with healthy controls postinjury. These results can help manage postoperative expectations of professional players and

amateurs alike while also assisting orthopaedic professionals caring for athletes of all levels following an Achilles rupture. Future investigations may help elucidate whether treating tendinosis in more veteran soccer players, who appear to be at a higher risk of Achilles rupture, can minimize the risk of tendon rupture.

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