Effect of Achilles Tendon Repair on Performance Outcomes After Return to Play in National Collegiate Athletic Association Division I Basketball Athletes

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Background: Achilles tendon (AT) ruptures are devastating injuries that are highly prevalent among athletes. Despite our understanding of the effect of AT rupture and in particular its relationship to basketball, no study has examined the effects of AT rupture and repair on performance metrics in collegiate basketball players.

Purpose: To evaluate the effect of AT rupture and subsequent surgical repair on performance metrics in National Collegiate Athletic Association (NCAA) Division I basketball players who return to play after injury.

Study Design: Descriptive epidemiology study.

Methods: NCAA Division I basketball players who sustained an AT rupture and underwent subsequent surgical repair between 2000 and 2019 were identified by systematically evaluating individual injury reports from databases comprising NCAA career statistics and individual school statistics; 65 male and 41 female players were identified. Athletes were included if they participated in at least one-half of the games of 1 collegiate season before tearing the AT and at least 1 season after operative repair. A total of 50 male and 30 female athletes were included. Each injured athlete was matched to a healthy control by conference, position, starter status at time of injury, class year, and number of games played. Matched controls were healthy players and experienced no significant injuries during their NCAA careers.

Results: After AT repair, male athletes had significantly more minutes per game, points per game, and compared with before injury. Total blocks significantly decreased after injury. Female athletes scored significantly more points per game but demonstrated a significantly lower 3-point shooting percentage after return to play. Despite undergoing AT rupture and repair, 14% of male players played in the National Basketball Association, and 20% of injured female athletes played in the Women's National Basketball Association.

Conclusion: After returning to play, men demonstrated a significant drop-off in performance only in regard to total blocks. Female athletes after AT repair demonstrated a significant improvement in points per game but had a significant drop-off in 3-point shooting percentage.

Keywords: Achilles tendon; basketball; NCAA; performance outcomes

Achilles tendon (AT) ruptures are devastating injuries that are highly prevalent among athletes. Across professional sports, the detrimental effects of an AT rupture on performance and return to play are well documented.[2,9,12,13,17,18,21] In this population, only an estimated 60% to 70% of athletes will ever return to play after an AT rupture.[2,12,13,17,18] Furthermore, those athletes who do return to play experience significantly decreased performance and athletic ability at >1 year after surgery.[2,9,18,21] In the general population,

basketball is the most common cause of AT rupture in male patients (rate, 46.9%), with the largest proportion of ruptures occurring in patients aged 20 to 39 years. While the incidence of AT ruptures is lower in patients <20 years old, basketball is still the most common mechanism of injury by a large margin.[5,8]

Despite our understanding of the effect of AT rupture on professional athletes and in particular its relationship to basketball, no study has examined the effects of surgically repaired AT rupture on performance metrics in collegiate basketball players. National Collegiate Athletic Association (NCAA) basketball players experience demanding workloads and place significant levels of stress on their

bodies, but physical stress and requirements placed on these athletes are vastly different from those of professional athletes. The purpose of our study was to compare performance metrics before and after AT repair in collegiate basketball players and to compare these metrics with those of matched controls. A greater understanding of the consequences of AT repair on this patient population may help athletes and medical professionals understand which performance metrics are most affected postoperatively.

METHODS

A retrospective review of NCAA Division I basketball players who sustained an AT rupture and underwent subsequent surgical repair between 2000 and 2019 was performed by systematically evaluating individual injury reports from databases comprising NCAA career statistics and individual school statistics. The databases are publicly accessible and contain biographies on players as well as comprehensive statistics stratified by games, year, and career. Institutional review board approval was waived for this study.

A total of 65 male and 41 female players were initially identified. Athletes were eligible for study inclusion if they participated in at least 1 collegiate season before tearing the AT and at least 1 collegiate season after undergoing operative repair. Players who were injured during their freshman season were included if they played in at least one-half of the team's games before the injury occurred. Athletes were excluded if they did not undergo operative repair, their definitive treatment was unknown, or they did not have enough pre- or postinjury statistics to be adequately evaluated. Therefore, players were excluded if they graduated before returning to play (n = 9), they had no preinjury NCAA statistics (n = 12), or they had no postinjury NCAA statistics (n = 5) (Figure 1). Operative technique and postoperative rehabilitation protocols were unable to be identified.

A total of 50 male and 30 female athletes were eligible for study inclusion after implementing inclusion and exclusion criteria. Each injured athlete was matched to a healthy control player by conference, position, starter status at time of player injury, class year, and number of games played. Matched controls were all healthy players and experienced no significant injuries during their NCAA careers. Age, body mass index (BMI), class year at time of injury, and position were collected as descriptive variables. Offensive and defensive performance statistics as well as overall games and minutes played were recorded
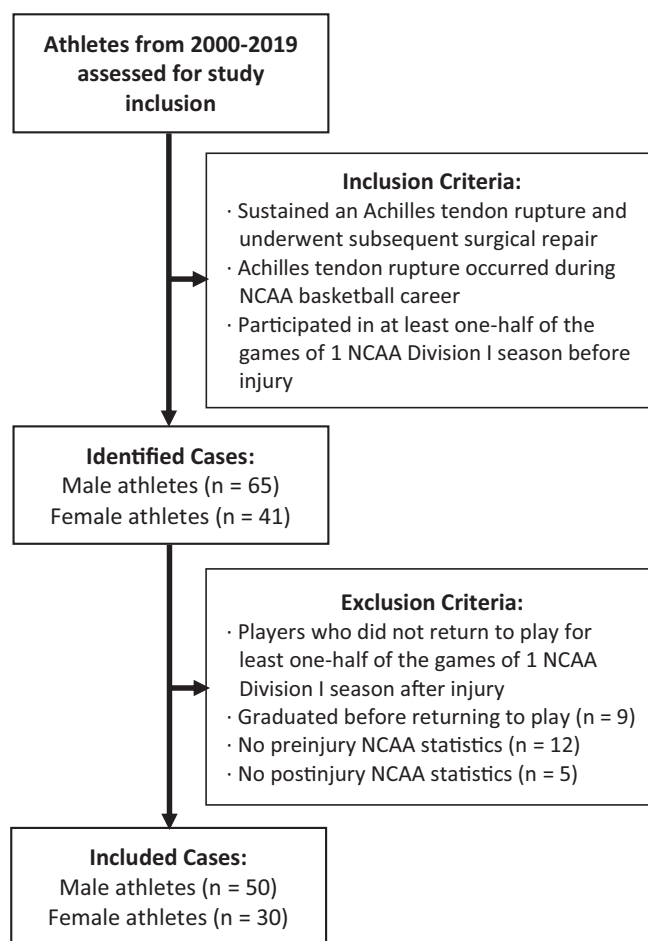

Figure 1. Flowchart of the participant selection process. NCAA, National Collegiate Athletic Association.

and compared. The year in which the injury occurred served as the index year. All statistics in the players' collegiate careers that were accumulated before injury were included as preinjury statistics, and all statistics accumulated after return to play were included as postinjury statistics. Total games played, total minutes played, and average minutes played per game were included to assess the effect on overall playing time. Offensive performance was assessed by comparing total points, average points per game, total assists, average assists per game, 3-point field goals made per game, 3-point shooting percentage, free throws made per game, and free throw percentage. Defensive performance was assessed by comparing total

rebounds, average rebounds per game, total steals, average steals per game, total blocks, and average blocks per game. Whether an athlete went on to play professional basketball at any level was also recorded. Draft position was noted if applicable.

Statistical Methods

An a priori power analysis was performed using independent-samples Student t tests to determine whether collegiate players who underwent AT repair differed significantly from healthy controls. A 2-sided test with a power of 0.8, significance level of .05, and effect size of 0.75 determined that a sample size of 29 was needed with a ratio of 1:1 for the injured and control groups.

After the matching of injured athletes to healthy controls, the sample was stratified into male and female athletes, and descriptive statistics were calculated. No BMI data were available for female athletes, and because of missing data, a reduced sample size was used during analyses for minutes played. Changes from pre- to postinjury for each group (in percentages) were calculated by subtracting the pre- from the postinjury mean, dividing this value by the preinjury mean, and multiplying by 100. Positive values represent an improvement in athletic performance from the pre- to postinjury period. Either the independent-samples t test (for parametrically distributed data) or the Mann-Whitney U test (for nonparametrically distributed data) was used as appropriate to compare the percentage change in each athletic performance variable between the injured group and the control group. Next, we compared pre- versus postinjury athletic performance variables using the paired-samples t test for continuous, parametrically distributed data. When the distribution of the differences in the pre- to postinjury period was found to have a nonparametric distribution for a specific variable, we used either the Wilcoxon signed rank test (for nonparametrically distributed data with symmetric distribution of differences between paired observations) or the sign test (for nonparametrically distributed data with nonsymmetric distribution of differences between paired observations). Percentage change between pre- and postinjury data was calculated by subtracting the percentage change of the healthy control from that of the injured athlete. Positive values represent the injured athlete improving more than did his or her matched healthy control from the pre- to postinjury period for a given athletic performance variable. Statistical analyses were conducted using IBM SPSS Statistics for Macintosh (Version 26.0; IBM Corp). P values <.05 were considered statistically significant in all analyses.

RESULTS

For NCAA male basketball players, the mean ± standard deviation age and BMI at injury were 21.1 ± 1.1 years and 25.3 ± 2.0, respectively, compared with 20.8 ± 1.0 years and 24.1 ± 1.5, respectively, for healthy controls. Three players (6%) were injured during freshman year; 11 (22%),

sophomore year; 18 (36%), junior year; 16 (32%), senior year; and 2 (4%), redshirt senior year. In the injury and control groups, 29 athletes (58%) played the guard position; 19 (38%), forward; and 2 (4%), center. Six athletes (12%) had confounding injuries associated with the AT rupture: 2 previous AT ruptures, 2 anterior cruciate ligament tears, 1 medial collateral ligament tear, and 1 hip surgery. Seven injured athletes (14%) ultimately played in the National Basketball Association (NBA), 9 (18%) played in another professional league, 7 (14%) were still in college at the time of data collection, and 27 (54%) did not go on to play any form of professional basketball. Among athletes in the control group, 7 (14%) ultimately played in the NBA, 6 (12%) played in another professional league, 7 (14%) were still in college at the time of data collection, and 30 (60%) did not go on to play any form of professional basketball.

Table 1 summarizes the change in various performance metrics before versus after AT repair in the male sample for the injured group and the control group. Regarding the performance variables of injured male athletes before versus after AT repair, athletes played more minutes per game (19.7 vs 22.6; $P = .017$), scored more points per game (6.7 vs 7.9; $P = .024$), had more assists per game (1.4 vs 1.7; $P = .036$), and made more 3-point field goals per game (0.5 vs 0.7; $P = .055$) than before injury. The only area of worsened athletic performance after AT repair was total blocks, which significantly decreased after injury (18.1 vs 10.2; $P = .004$). Among healthy controls, players played significantly more minutes per game (18.5 vs 22.7; $P < .001$), scored more points per game (5.6 vs 7.7; $P < .001$), had more steals per game (0.5 vs 0.7; $P = .002$), had more assists per game (1.4 vs 1.9; $P < .001$), had more blocks per game (0.3 vs 0.4; $P = .03$), made more 3-point field goals per game (0.5 vs 0.8; $P < .001$), and made more free throws per game (1.3 vs 1.7; $P < .001$) in the matched postinjury period as compared with the matched preinjury period. Finally, between the injured players and matched controls, healthy players demonstrated a higher percentage change in assists per game ($P = .036$) and total blocks ($P = .031$).

For NCAA female basketball players, the mean age at injury was 20.0 ± 1.1 years as compared with 20.1 ± 1.3 years for controls. BMI was unable to be collected for these players because of limitations in available data. Two players (6.7%) were injured during freshman year; 9 (30%), sophomore year; 14 (46.7%), junior year; 4 (13.3%), senior year; and 1 (3.3%), redshirt senior year. In the injury and control groups, 17 athletes (56.7%) played the guard position; 10 (33.3%), forward; and 3 (10%), center. Six athletes (20.0%) had confounding injuries associated with the AT rupture: 3 previous AT ruptures, 2 anterior cruciate ligament tears, and 1 undisclosed injury. Six athletes (20%) ultimately played in the Women's NBA (WNBA), 1 (3.3%) played in another professional league, 5 (16.7%) were still in college at the time of data collection, and 18 (60%) did not go on to play any form of professional basketball. Among the control group athletes, 5 (16.7%) ultimately played in the WNBA, 1 (3.3%) played in another professional league, 5 (16.7%) were still in college at the time of data collection, and 19 (63.3%) did not go on to play any form of professional basketball.

TABLE 1
Change in Athletic Performance Variables Among Male NCAA Basketball Players Before vs After Achilles Tendon
Repair Compared With Matched Healthy Controls[a]

Variable	Injured Athletes (n = 50)				Healthy Controls (n = 50)				% Change[c]	P Value[d]
	Before Injury	After Injury	% Change	P Value[b]	Before Injury	After Injury	% Change	P Value[b]		
Games played	50.8 ± 29.6	40.6 ± 22.5	−20.1	.069	54.4 ± 26.8	54.3 ± 28.7	−0.1	.75	−20.0	.356
Minutes played										
Total	1114.7 ± 898.2	954.1 ± 683.6	−14.4	.24	1074.9 ± 781.0	1271.0 ± 900.6	18.2	.482	−32.6	.333
Per game	19.7 ± 7.6	22.6 ± 8.7	14.7	**.017**	18.5 ± 7.9	22.7 ± 8.9	22.7	**<.001**	−8.0	.593
Points scored										
Total	382 ± 362.1	342 ± 303	−10.5	.342	315.9 ± 274.4	441.5 ± 351.5	39.8	.053	−50.2	.191
Per game	6.7 ± 4.1	7.9 ± 4.5	18.4	**.024**	5.6 ± 3.5	7.7 ± 4.7	38.6	**<.001**	−20.2	.261
Rebounds										
Total	175.8 ± 147	144.1 ± 103.4	−18.1	.146	159.3 ± 143.8	199 ± 163.6	24.9	.332	−43.0	.22
Per game	3.1 ± 1.6	3.5 ± 1.9	12.2	.098	2.9 ± 1.9	3.6 ± 2.2	24.0	**.001**	−11.8	.318
Steals										
Total	39.7 ± 38.9	30.7 ± 24.6	−22.7	.173	29 ± 23.7	41.1 ± 36.6	41.5	.127	−64.2	.166
Per game	0.7 ± 0.4	0.7 ± 0.4	9.6	.225	0.5 ± 0.3	0.7 ± 0.4	30.0	**.002**	−20.5	.105
Assists										
Total	89.7 ± 115.3	76.9 ± 87.2	−14.3	.424	81.4 ± 87	115 ± 124.6	41.3	.153	−55.7	.085
Per game	1.4 ± 1.2	1.7 ± 1.4	21.8	**.036**	1.4 ± 1.2	1.9 ± 1.4	39.0	**<.001**	−17.2	**.036**
Blocks										
Total	18.1 ± 21	10.2 ± 10	−43.5	**.004**	13.8 ± 21.3	21.4 ± 34.6	55.1	.077	−98.5	**.031**
Per game	0.4 ± 0.5	0.3 ± 0.3	−26.0	.097	0.3 ± 0.4	0.4 ± 0.7	52.4	**.03**	−78.4	.054
3-PT										
FG made	0.5 ± 0.5	0.7 ± 0.6	28.3	.055	0.5 ± 0.6	0.8 ± 0.8	46.1	**<.001**	−17.8	.225
%	0.3 ± 0.2	0.3 ± 0.2	7.2	.669	0.3 ± 0.2	0.3 ± 0.2	17.2	.214	−10.0	.281
FT										
Per game	1.5 ± 1.1	1.8 ± 1.4	17.0	.056	1.3 ± 0.7	1.7 ± 1.1	33.7	**<.001**	−16.8	.385
%	0.7 ± 0.2	0.7 ± 0.2	0.4	.057	0.7 ± 0.1	0.7 ± 0.2	−0.9	.502	1.3	.372

[a]Data are reported as mean ± SD unless otherwise indicated. Bold indicates statistically significant difference (P < .05). 3-PT, 3-point field goal; FG, field goal; FT, free throw; NCAA, National Collegiate Athletic Association.
[b]Paired *t* test comparing pre- vs postinjury.
[c]Percentage change calculated by subtracting the percentage change of the healthy control from that of the injured athlete. Positive values represent the injured athlete improving the athletic variable more than did the healthy control.
[d]Independent-samples *t* test comparing percentage change between the groups.

Table 2 summarizes the change in various performance metrics before versus after AT repair in the female sample for the injured group and the control group. Regarding the athletic performance variables of injured female athletes before versus after AT repair, athletes scored more points per game after returning from injury (6.3 vs 7.6; P = .032). Female athletes also demonstrated a significantly lower 3-point shooting percentage (10% vs 20%; P = .047) after return to play versus before injury. Among healthy controls, players scored significantly more points per game (5.3 vs 7.6; P = .005), had more rebounds per game (2.7 vs 3.8; P = .002), had more steals per game (0.7 vs 0.9; P = .006), made more 3-point field goals per game (0.5 vs 0.8; P = .002), and made more free throws per game (0.9 vs 1.3; P = .01) in the matched postinjury period as compared with the matched preinjury period. Between the injured players and the matched controls, healthy players had a significantly higher percentage change in 3-point shooting percentage (P = .01).

DISCUSSION

After AT repair, male collegiate basketball players showed significant increases in per-game means for minutes played, points scored, and assists. This improvement in postoperative performance opposes the findings of previous studies examining performance outcomes after AT repair in NBA athletes. Amin et al[2] examined NBA player efficiency ratings—a player's per-minute productivity that takes multiple statistics into account—and minutes played per game after AT repair. In their series, they found that player efficiency ratings and total minutes played per game significantly decreased. A factor explaining why collegiate basketball players perform better than do NBA players after AT repair may be a decreased healing response attributed to age, which is a known intrinsic risk factor for Achilles tendinopathy.[10] In our series, the mean age for men was 21.1 years, as opposed to 29 years in the series by Amin et al.[2] Another contributing factor may be the differing levels of competition

TABLE 2
Change in Athletic Performance Variables Among Female NCAA Basketball Players Before vs After Achilles Tendon Repair Compared With Matched Healthy Controls[a]

Variable	Injured Athletes (n = 30)				Healthy Controls (n = 30)				% Change[c]	P Value[d]
	Before Injury	After Injury	% Change	P Value[b]	Before Injury	After Injury	% Change	P Value[b]		
Games played	49.1 ± 27.2	37.9 ± 24.2	−29.7	.149	56.9 ± 29.6	44.2 ± 28.7	−22.3	.100	−7.39	.636
Minutes played										
Total	843.2 ± 798.9	764.3 ± 658.8	−9.4	.818	950.4 ± 734.3	823.6 ± 710.6	−13.3	.630	−9.99	.912
Per game	17.6 ± 10.8	18.8 ± 9.4	6.8	.753	15.0 ± 8.0	18.8 ± 11.4	25.3	.167	6.65	.846
Points scored										
Total	341.1 ± 340	313.4 ± 264.6	−8.8	.709	340.9 ± 285.6	390.2 ± 379.3	14.5	.855	−23.30	.756
Per game	6.3 ± 4	7.6 ± 4.2	16.9	**.032**	5.3 ± 3.2	7.6 ± 4.8	44.3	**.005**	−27.40	.657
Rebounds										
Total	195.1 ± 197.3	174.2 ± 134.7	−12.0	.596	179.9 ± 160.6	173.7 ± 149	−3.5	.855	−8.56	.906
Per game	3.7 ± 2.6	4.3 ± 2.5	14.2	.070	2.7 ± 1.7	3.8 ± 2.4	40.8	**.002**	−26.63	.301
Steals										
Total	49.7 ± 52.2	39.9 ± 46.2	−24.6	.423	42.8 ± 39.5	42.3 ± 42.6	−1.2	.855	−23.40	.652
Per game	0.9 ± 0.7	0.9 ± 0.7	7.7	.599	0.7 ± 0.4	0.9 ± 0.6	30.6	**.006**	−22.96	.222
Assists										
Total	64.7 ± 76.2	55.5 ± 52.9	−16.5	.524	59.4 ± 52.8	75.1 ± 74.5	26.4	.584	−42.94	.790
Per game	1.1 ± 0.9	1.4 ± 1.1	16.7	**.023**	0.9 ± 0.6	1.5 ± 1	60.4	**<.001**	−43.65	.329
Blocks										
Total	18.6 ± 28.3	16.6 ± 26.4	−12.0	.748	17.4 ± 21.4	16.7 ± 20.1	−4.4	.700	−7.65	.585
Per game	0.4 ± 0.5	0.4 ± 0.4	5.0	.672	0.3 ± 0.3	0.4 ± 0.5	53.0	.055	−48.02	.137
3-PT										
FG made	0.2 ± 0.3	0.3 ± 0.4	47.6	.246	0.5 ± 0.5	0.8 ± 0.7	55.2	**.002**	−102.80	.185
%	0.2 ± 0.2	0.1 ± 0.1	−7.6	**.047**	0.3 ± 0.2	0.3 ± 0.1	−7.6	.345	0.00	**.010**
FT										
Per game	1.5 ± 0.9	1.7 ± 1	12.4	.127	0.9 ± 0.8	1.3 ± 1	35.4	**.010**	−22.99	.820
%	0.6 ± 0.1	0.7 ± 0.2	3.1	.572	0.7 ± 0.2	0.7 ± 0.2	−0.8	.375	3.86	.915

[a]Data are reported as mean ± SD unless otherwise indicated. Bold indicates statistically significant difference ($P < .05$). 3-PT, 3-point field goal; FG, field goal; FT, free throw; NCAA, National Collegiate Athletic Association.

[b]Paired t test comparing pre- vs postinjury.

[c]Percentage change calculated by subtracting the percentage change of the healthy control from that of the injured athlete. Positive values represent the injured athlete improving the athletic variable more than did the healthy control.

[d]Independent-samples t test comparing percentage change between the groups.

and skill required to compete in Division I basketball versus the NBA. Postinjury improvements in performance may be due to the fact that collegiate players improve over time with experience, they physically mature and get stronger as they age, and playing more and gaining experience allows them to adjust to the collegiate game. Despite undergoing AT repair, 7 of 50 players (14%) in our series played in the NBA, matching the frequency of their uninjured counterparts who composed the control group.

The only significant decrease seen in collegiate male basketball players after AT repair was in total blocks. In addition, healthy controls demonstrated a significantly higher percentage change in total blocks compared with injured players. Healthy controls also significantly improved in steals per game and blocks per game, which was not seen in the injured group. In NBA players, Amin et al[1] showed that all performance metrics decreased in players after AT repair compared with those in healthy controls; however, rebounds, steals, and blocks per game were the only outcomes to significantly decrease. This suggests that defensive performance is affected more than is offensive

performance after AT repair. An explanation may be that defensive play relies mostly on athletic reactionary movements and repetitive jumping, which exerts large forces on the AT and places more stress on the repair.[6] Finally, it is important to note that our control group had a significantly lower BMI than did our injured group (24.1 vs 25.3; $P = .001$), suggesting a possible association between heavier players and AT ruptures. By definition, a BMI of 18.5 to 25 is considered normal, and >25 is considered overweight. Given that our injured players had an "overweight" BMI of 25.3 and our controls had a "normal" BMI of 24.1, it is possible that overweight athletes may be at increased risk of AT rupture. While this difference may be clinically small, we believe that it is an important finding to include and possibly evaluate in future studies. Furthermore, an argument can be made that although collegiate athletes with a BMI of 25.3 are not actually overweight, the added weight may produce increased strain on the AT, which could contribute to increased rupture risk.

Female NCAA Division I basketball players who sustained an AT rupture and underwent subsequent repair

showed a significant increase in points per game and a significant decrease in 3-point shooting percentage as compared with their preinjury period. The significant increase in points per game was also seen in male athletes, which could be explained by increased shooting drills and altered mechanics during the rehabilitation period as well an overall improvement that may come with increased experience and understanding of the collegiate game. The significant decrease in female 3-point shooting percentage could be explained by a lack of explosiveness or change of direction contributing to an inability to create separation from the defender and resulting in more contested 3-point field goal attempts. This effect of AT injury on creating separation may also be explained by the significantly better 3-point shooting percentage in the healthy controls versus the athletes who underwent AT repair. There is currently no literature investigating performance outcomes after AT repair in female basketball players at any level, so these findings should serve as a baseline for future studies.

In a recent epidemiological study outlining AT injuries in collegiate-level athletes, Chan et al[4] determined that basketball is the most frequent cause of AT ruptures in male athletes (injury rate, 4.26) and the second most frequent cause in female athletes (injury rate, 3.32), trailing only gymnastics. This finding has been supported by a study showing that the male:female ratio of AT rupture ranges from 3.72:1 for all AT ruptures to as high as 5.39:1 for acute ruptures.[19] These findings of an increased incidence of AT ruptures in male athletes over female athletes was supported by our study, in which 65 male and 41 female collegiate basketball players were identified in the same period. The discrepancy seen in incidence of AT rupture between the sexes may be explained by hormonal protection of estrogen on the AT in female athletes, accounting for less AT strain and a decreased risk of rupture; however, this explanation warrants further investigation.[3,7,11,14,15]

There are several limitations with our analysis of performance outcomes in NCAA Division I basketball players after AT repair. The limitations stem mostly from our data collection. Operative techniques (percutaneous vs open repair), complications, and postoperative rehabilitation protocols utilized could have affected postoperative performance and were not accounted for. The reason is that athletes with AT ruptures who underwent surgical repair were identified from school websites and NCAA injury reports rather than from operative reports. This, however, has been the method used in similar studies.[20] Because injured athletes missed approximately 1 season of playing time on average, they were not subject to the same load as were healthy controls, which may have contributed to changes in player performance. This is an inherent limitation for which we could not control within the methodology of our study. Stemming from limitations associated with the quality of data available, we were unable to accurately evaluate return-to-play statistics owing to the inability to identify whether careers ended because of injury or players transferred schools after injury. We understand that this is an inherent limitation to our

study, as it is valuable to know the percentage of players who return to play, but we believe that it is still valuable to understand performance trends in those who do return. Furthermore, the focus of this study was to evaluate statistical changes in players who did return, which we argue is more valuable information for players, staff, and medical personnel when tailoring rehabilitation to specific player needs and circumstances.

Additional limitations include the retrospective nature, small sample size, and large effect size (0.75) used in our a priori power analysis. For example, in our male cohort, players experienced increases that were not statistically significant in points, rebounds, 3-point field goals made, and free throws made per game after returning from injury. Similarly, our female cohort had a nonsignificantly larger number of points, rebounds, steals, and free throws made per game after injury. With a larger sample size, it is possible that some or all of these metrics would show statistical significance. Finally, 2 male players and 3 female players had a confounding injury of a previous AT rupture. Of these 5 players, 2 previously ruptured the contralateral AT, but because of the inherent limitations of the sites from which we collected the data, we were unable to determine which AT was torn for the other 3 players. There is an argument to be made that these players should have been excluded from the study; however, it is important to note that previous studies on AT injuries treated operatively and nonoperatively have reported rerupture rates of 2% and 4%, respectively.[16] Given that these players were able to return to play in NCAA Division I basketball after the initial AT rupture, we ultimately thought it best to include them in the statistical analysis because information on postoperative performance is valuable in all players, including those with previous AT injuries. Furthermore, the athletes who experienced a second AT injury did not represent outliers in percentage change from pre- to postinjury on any of the performance metrics evaluated.

Study strengths include the carefully selected healthy controls, who were matched by conference, position, starter status at time of player injury, number of games played, and class year. In addition, to our knowledge, this is the first performance analysis performed on NCAA basketball players after AT repair. With that being said, future studies involving larger cohorts after operative and nonoperative management of AT rupture are warranted. Furthermore, identification and inclusion of postoperative rehabilitation protocols in future studies in addition to management choice are necessary to assess the effect of these varying interventions on postoperative performance metrics. The various inter- and intra-athlete factors that may contribute to differences in athletic performance after AT repair were largely addressed in our study by matching injured athletes to healthy controls and performing independent and paired analyses. These data will provide valuable information to players, coaches, and medical personnel to educate NCAA basketball players on their postinjury expectations of athletic performance relative to their peers and their previous level of play.

CONCLUSION

After returning to play, male athletes demonstrated a significant decrease in performance in regard to total blocks. They did not have a significant decrease in any other performance metric. They did, however, show less improvement with several defensive statistics, such as steals per game and rebounds per game, compared with healthy matched controls. Despite undergoing AT repair, 14% of the players in our series went on to compete in the NBA.

After AT repair, female athletes demonstrated a significant improvement in points per game scored while seeing a significant decrease in 3-point shooting percentage. Matched healthy controls had a significantly higher percentage change in 3-point shooting percentage as compared with the female athletes who underwent AT repair. Despite undergoing AT repair, 20% of players went on to compete in the WNBA.

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