Annals of Biomedical Research
An open access journal
ISSN 2817-2094
eSciRes
Research Article
ABR-5-129

Return to Basketball for College and Professional Athletes After Surgical Repair of Achilles Tendon

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Abstract

Background: Basketball places extreme mechanical stress on an athlete's body, leading to a variety of injuries within the sport. Achilles tendon (AT) ruptures have started to garner attention as the incidence of this season ending injury continues to increase [1]. AT ruptures have also been shown to have a higher prevalence in basketball compared to other sport populations. [2]. With the recovery time of AT ruptures being a minimum of 6 months, and data supporting a decrease in player performance and career longevity, it is important to understand the indicated pathophysiology behind the injury along with the surgical management options [2]. **Objective:** This article aims to investigate the return to basketball for collegiate and professional athletes after an achilles tendon rupture. **Methods:** A systematic literature search was conducted using the University of Texas Rio Grande Valley (UTRGV) online database. The search included the terms "achilles" and "return to play" to identify relevant studies assessing average time of return to play and the factors that can influence said time. **Results:** A total of 19 studies were reviewed, showing that 9-10 months was the average duration of return to play for professional basketball players following an achilles injury. Multiple publications show a player's performance decrease following injury while one manuscript showed an improvement in performance for players, which could be attributed to the latter investigating collegiate players that are younger than professional basketball players. **Conclusion:** There is evidence that supports a reasonable expectation for athletes to return to play 10 months after an AT surgery. However, a variety of factors contribute to the ability of the individual athlete to return to play.

Keywords: Basketball; Achilles; Return to play; Rehabilitation

Introduction

Basketball places extreme mechanical stress on an athlete's body, leading to a variety of injuries within the sport. Achilles tendon (AT) ruptures have garnered attention as the incidence of season ending injuries continues to increase [1]. AT ruptures have also been shown to have a higher prevalence in basketball compared to other sport populations [2]. It is important to understand the indicated pathophysiology behind the injury due to the lengthy recovery time of 6-12 months and the deterioration in performance [2]. Due to the nature of basketball, an impressive amount of biomechanical stress is placed on the AT. In particular, when the knee is extended and the foot is dorsiflexed through a change in direction, an extreme amount of eccentric load is placed on the AT, leading to potential rupture [3]. Risk factors associated with this injury include increased age, anatomical variations, changes in biomechanics of the ankle and foot, and deviations in player performance characteristics [3]. The aim of this paper is to determine the ability for athletes to return to basketball after surgical repair of the achilles. While AT ruptures are one of the more severe injuries indicating surgery, it is important that all AT pathologies requiring surgery are analyzed to determine the outcomes of athletes who receive invasive treatment [3].

Methods

A literature search was conducted using the University of Texas Rio Grande Valley online database. The search included the terms "achilles" and "return to play" to identify studies assessing return to play in basketball athletes. Inclusion criteria focused on studies investigating collegiate or professional basketball players undergoing surgical repair for AT ruptures. Studies were excluded if they examined non-basketball athletes or focused on non-surgical treatment of achilles ruptures.

Results

Multiple researchers support a reasonable expectation of high-level athletes to return to play 9-10 months after AT surgery [4-6] (Table 1). Researchers highlight a minimum of 6 months for the initial recovery but closer to 9 months for a return to competitive play [4]. There is no consensus on the optimal technique for repairing an acute AT rupture, but the most common treatments include an open surgical repair and a minimally invasive surgical repair [7].

Author	Injury	Time to Return to Play
Wang et al.[4]	Achilles Rupture	9 months
Chauhan et al.[6]	Achilles Rupture	10.2 months ± 3.3 months
Siu et al.[5]	Achilles Rupture	10.1 months ± 4.0 months

Table 1: Achilles injury return to play.

Discussion

The nature of basketball requires athletes to frequently use their achilles to commit dynamic movements such as accelerating, pivoting, and jumping. These exercises result in significant strain and eccentric loading through the elongation of the muscles under tension [3]. When done too rapidly or over a long period of time, these movements can create micro-tears or a full thickness tendon rupture [4]. The high rates of AT injuries among basketball players highlights the need for extensive eccentric stretching, strengthening, and conditioning to manage the tendon's load. Understanding the mechanical forces of this injury helps collegiate and professional athletes along with medical professionals develop strategies to reduce the incidence of injury.

Treatment of a rupture can depend on numerous factors including surgeon preference. A systematic meta-analysis concluded that there was a significantly decreased risk of postoperative complications in the minimally invasive surgery with comparable outcomes in terms of re-rupture, range of motion, and return to preinjury activity level [7].

The rehabilitation process for an AT rupture is designed to provide a progressive approach to allow the tendon to heal properly while minimizing the possibility of reinjury. Rehabilitation principles highlight early immobilization and reducing the weight bearing status. Additionally, early physical therapy provides the tendon with the stressors necessary to stimulate tissue remodelling and preventing muscle atrophy and adhesion formation [4]. Research has demonstrated the importance of functional bracing with early range of motion in achieving good clinical outcomes [4]. Wang et al. detail a recommended seven phase protocol for full rehabilitation. During the first two weeks, the priority is to control inflammation and pain through gentle rehabilitation exercises targeting the quadriceps and hamstrings instead of the injured ankle [4].

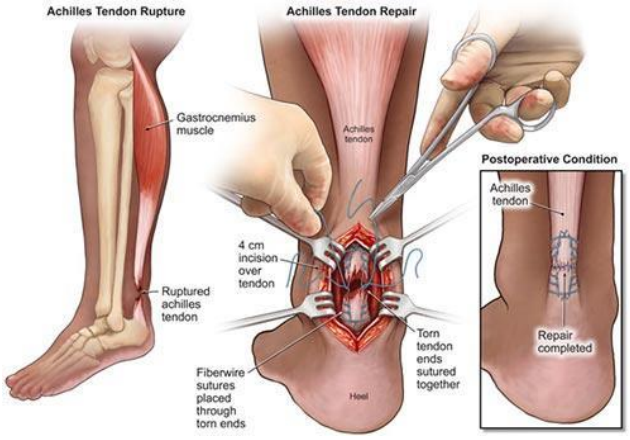

Figure 1: Acute achilles tendon ruptures (https://www.opaortho.com/acute-achilles-tendon-ruptures/).

From weeks three to six, the plan gradually introduces range of motion exercises such as passive movements to promote flexibility which are then progressed to active range of motion exercises. The exercises intensify in weeks seven to twelve to include low-impact aerobic and resistance training to rebuild strength and restore balance. The last phase allows for the cautious reintroduction into high intensity activities such as jogging and sprinting.4 Ultimately, this structured approach provides athletes with an easily measurable timeline of their return. It is imperative that athletes avoid excessively loading their achilles prematurely, as this could jeopardize the entire recovery process.

Phase	Timeframe	WT Bearing	Immobilization	Therapeutic Exercises
Phase I: Protection Phase	0–2 wks	NWB	Splint	Knee Rehab: Quads and Hamstring stretches
Phase IIa: Initiation of PWB and ROM	3-4 wks	PWB-WBAT	Boot - 3 wedges	ROM: Dorsi/plantar flexion **Do not place ankle beyond neutral dorsiflexion during any exercise until week 7** Home program: Instruct patient to do active ROM exercises between therapy visits with care in preventing ankle dorsiflexion (3 sets of 30, 3 times per
Phase IIb: Initiation of PWB and ROM	5-6 wks	WBAT	Boot - 3 wedges **One out per wk**	ROM: Inversion/eversion Do not place ankle beyond neutral dorsiflexion during exercise until wk 7. **Scar massage/desensitization.**

Phase III: Advanced ROM and Strengthening	7-8 wks	WBAT	Boot - 1 wedge Then no wedges	ROM: advance to full range in all planes Stretching: **GENTLE** gastrocnemius, soleus, and hamstring Strengthening: TheraBand—all 4 quadriceps
Phase IV: Elimination of Walking Boot	9-10 wks	WBAT	No boot	Stretching: advance gastroc, soleus, and hamstring stretching Strengthening: concentric exercises—all 4 quadriceps
Phase V: Low Effect WB	11-12 wks	Low effect WB	None	Low-effect aerobic: elliptical, walking, and stairmaster **Strengthening: eccentric exercises—all 4 quadriceps**
Phase VI: High Effect WB	13-17 wks	High effect WB	None	High-effect aerobic — running/ jogging Strengthening: eccentric exercises—all 4 quadriceps
Phase VII: Return to Sport Specific Activities	18-52 wks	High effect WB	None	**Sports specific cutting/ acceleration/deceleration**

NWB, nonweight bearing; PWB, passive weight-bearing; WB, weight-bearing; WBAT, weight-bearing as tolerated; WT, weight.
Adaptation from: Wang KC, Cotter EJ, Cole BJ, Lin JL. Rehabilitation and return to play following Achilles tendon repair. Operative Techniques in Sports Medicine. 2017;25(3):214-219.

Table 2: Achilles injury rehabilitation timeline.

The recovery time for basketball players to return to play is notably extended and intricate due to the demanding and dynamic nature of their movements. The significant sidelined duration is crucial to achieve healing and the necessary physical strength, agility, balance, and explosive power that is demanded from basketball players.

Athletes often wonder whether they will recover to their pre-injury playing ability. Several sources report a decline in performance after injury, while one suggests an improvement in performance [4,6,8,9]. The main difference could stem from the populations studied. Sanchez investigated collegiate athletes while the other researchers looked at NBA athletes. 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 [9]. Another possible explanation could stem from the combined physical and psychological stress that coming back from that type of injury entails and expecting to play at the highest level.

Chauhan et al. defined a significant decline in value over replacement player rating, box plus-minus, and offensive rating compared to controls [6]. Interestingly, there was no significant decrease in their defensive performance ratings. Research by Wang et al. supported this claim, as they demonstrated that while 72.5% and 70.8% of athletes returned to play following their injury, these athletes faced decreases in playing time and statistically lower performance levels [4]. Lastly, Amin et al. [8] 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 [6].

Conclusion

A variety of factors contribute to the ability of the individual athlete to return to play. Due to the biomechanical stress basketball places on the AT, it is our recommendation that appropriate post operative procedures be adhered to following determination of AT surgery. More research is required to determine the effects of AT surgery on player performance.

It is becoming increasingly crucial for basketball trainers across all levels to implement and maintain appropriate, evidence-based measures to prevent athletic training injuries. This paper also helps to clarify the seriousness of AT surgery and provides an outlined timetable on the return to competitive basketball.

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Received date: November 25, 2024; **Accepted date:** January 28, 2025; **Published date:** January 31, 2025

Citation: Bonilla P, Butler H, Ahmad A, Ahmad AN (2025) Return to Basketball for College and Professional Athletes After Surgical Repair of Achilles Tendon. *Ann Biomed Res* 5(2): 129.