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Research Article

Achilles Tendon Rupture Trends During the COVID-19 Pandemic

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Abstract

Background and Objectives: *The Achilles tendon (TA) is the most common site of tendinous injury. No studies have been published examining the effect of coronavirus-related lockdowns on the incidence and management of TA injury. We aim to determine the effect of COVID-19 on the incidence, patient demographics, mechanism of injury and management of Achilles tendon rupture.*

Methods: *Data from a large teaching hospital in the United Kingdom (UK) was analysed retrospectively. Cases of TA rupture were identified between 1st of March 2019 to 31st of March 2022, to obtain 12 months of baseline data prior to the introduction of the first national lockdown in March 2020, 12 months of lockdown data, and 12 months of data after the last UK lockdown ended.*

Results*: 151 patients with TA rupture were included in the study. The number of patients with TA injury fell during lockdown periods and rose sharply once restrictions were lifted. There was a male preponderance to injury throughout (p=0.019). Sporting-related injury was the predominant mechanism of injury throughout the study period, although the proportion of non-sporting injuries increased during lockdowns. There was a rise in non-operative management during national COVID restrictions.*

Conclusions*: The COVID-19 outbreak and subsequent lockdowns had an impact on the incidence of TA ruptures and their management in our centre. In particular, there was a significant increase in TA injuries in the 3 months following the lifting of restrictions. There seemed to be an increasing trend towards operative management of these patients once lockdown restrictions were lifted.*

Keywords: *Achilles tendon rupture; Achilles tendon injury; coronavirus; COVID-19.*

Abbreviations

TA – Achilles tendon

UK – United Kingdom

NHS – National Health Service

BOA – British Orthopaedic Association

Introduction

The Achilles tendon (TA) is the strongest and largest tendon in the body, as well as the most common site of tendinous injury [1]. TA ruptures have been increasing in frequency; this is thought to be due to an increase in prevalence of obesity, an ageing population, and rising popularity in sport participation [2].

Following the first cases of COVID-19 in the United Kingdom (UK) in January 2020, a national lockdown was implemented in March 2020. The lockdown put a temporary stop to most sporting-related activities, with restrictions intermittently continuing for close to a year. Within professional sports there have already been several reports linking injuries such as TA ruptures to the return to sport after COVID lockdowns. Seshadri et al reported injury rates among football players in the Bundesliga, which increased threefold [3]. Prior to COVID lockdowns there have been very few occasions where sports have been restricted over a prolonged period of time, however a 2011 National Football League lockout led to 4.5 months without training; this was also associated with increased rates of injury [4].

Throughout the pandemic, changes were introduced to the day-to-day running of the National Health Service (NHS) in order to manage the amounting pressures of the coronavirus, affecting the management of patients across all departments. New guidance from the British Orthopaedic Association (BOA) encouraged use of non-operative treatments where possible to minimise admissions to hospitals [5]. No studies have been published on how this advice, and the pandemic in general, affected the management of TA ruptures.

The aim of this study is to assess the effect of COVID-related lockdowns on the incidence of Achilles tendon ruptures within a large teaching hospital in the UK. We also aim to examine the mechanism of injury, changes to patient demographics, and trends in the management of patients.

Materials and Methods

Data was gathered retrospectively from the electronic hospital database, Pathpoint eTrauma (OpenMedical – London, United Kingdom). All cases of Achilles tendon rupture were identified between 1st of March 2019 to 31st of March 2022. This yielded a one-year period of baseline data prior to the introduction of national lockdown, a 12-month period of lockdown restrictions, and a 13-month period after the last lockdown was lifted. Both clinical and radiological diagnoses of TA rupture were accepted.

Data gathered for each patient included demographic details, date of the injury, mechanism of injury, and management of injury. Statistical analysis was performed using the ANOVA Two-Factor Test on Microsoft Excel software Data Analysis pack.

Results

A total of 151 patients with Achilles tendon rupture were identified in the specified time period. The period was divided into pre-lockdown, during lockdown, and post-lockdown to determine the number of patients within each timeframe. The start of lockdown was defined as the 23rd of March 2020. Following this there was a year of fluctuating restriction with the third and final lockdown ending on the 8th of March 2021. Results and demographic information are presented in Table 1. The number of patients with TA rupture decreased during the lockdown period, with 30 presentations, which accounted for 19.9% of total cases identified. There was a slightly higher number of cases post-lockdown compared to pre-lockdown (65 and 56 patients, respectively).

	Achilles Tendon Rupture (%)			
	Total	**Pre-lockdown**	**During lockdown**	**Post-lockdown**
Number	151	56 (37.1%)	30 (19.9%)	65 (43%)
Mean age	45.5	47.4	45.9	43.2
Gender:				
Male	127 (84.1%)	45 (80.4%)	28 (93.3%)	54 (83.1%)
Female	24 (15.9%)	11 (19.6%)	2 (6.7%)	11 (16.9%)
				p=0.019
Mechanism of injury:				
Sporting related	108 (71.5%)	41 (73.2%)	18 (60%)	49 (75.4%)
Non-sporting related	41 (27.2%)	14 (25%)	12 (40%)	15 (23.1%)
Unknown	2 (1.3%)	1 (1.8%)	0	1 (1.5%)
				p=0.41

Table 1: Incidence, demographics, and mechanism of injury of Achilles Tendon Rupture patients presenting before, during, and after national lockdowns.

There was a male preponderance to TA rupture throughout all study periods (p=0.019). There was a higher proportion of non-sporting related injuries during the lockdown period (40%), compared to pre- and post-pandemic times (25% and 23.1%, respectively) although these findings were not statistically significant (p=0.41).

The mean patient age was 45.5 (18-87), and it was comparable throughout the 3-year period. Patients were further subcategorised into age groups according to decades, and the proportion of injury amongst each age group plotted on a graph (Figure 1).

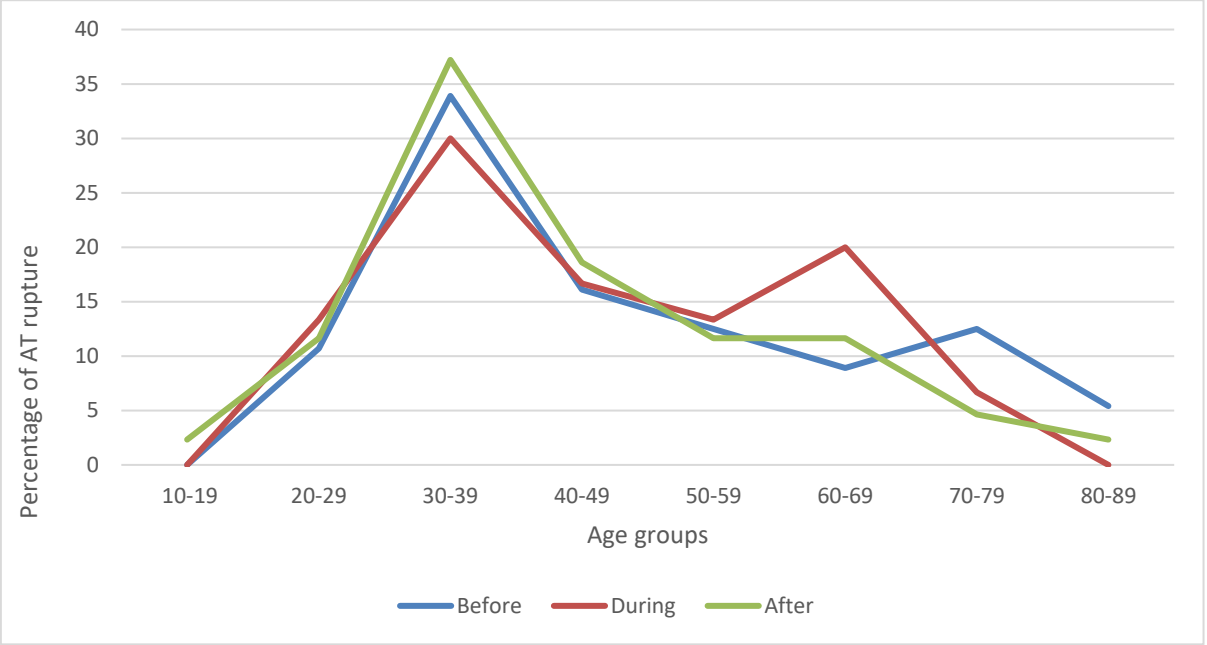

Figure 1: Proportion of Achilles tendon rupture amongst different age groups in the pre-, during, and post-lockdown periods.

The management of patients was recorded, noting whether surgical intervention occurred or not. Data on management was missing in a total of 8 patients. Results are presented in Table 2. There was a greater proportion of patients undergoing surgery after restriction were lifted (41.5%), compared to pre-pandemic and pandemic time periods (23.2% and 13.3%, respectively), however this finding did not demonstrate statistical significance (p=0.11).

	Pre-lockdown (%)	**Lockdown (%)**	**Post-lockdown (%)**
Total patients	56	30	65
Non-operative management	36 (64.3%)	25 (83.3%)	38 (58.5%)
Surgical management	13 (23.2%)	4 (13.3%)	27 (41.5%)
Data not available	7	1	0
			p=0.11

Table 2: Surgical and non-operative management in Achilles tendon rupture patients

A further analysis was undertaken of the total number of patients with TA rupture presenting each month over the 37-month period. Results are presented in Figure 2. Sharp increases in cases were noted in September 2020, and April through to June 2021.

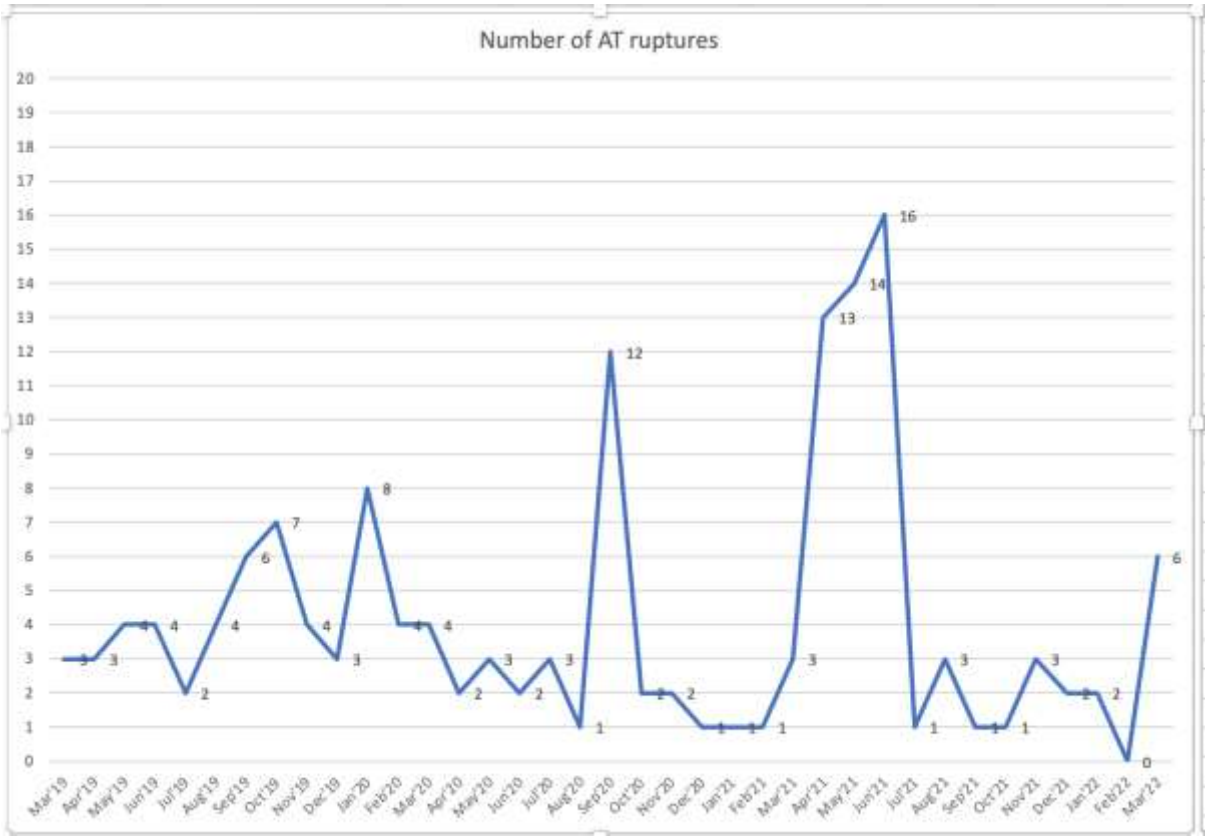

Figure 2: Number of AT ruptures per month between March 2019 and March 2022

Discussion

Incidence and Mechanism of Injury

The study demonstrates a sharp increase in the number of patients presenting with Achilles tendon rupture in the first 3 months after lockdown measures were relaxed, with 43 patients recorded between April and June 2021, compared to 56 patients presenting over 12 months prior to the pandemic (quarterly average of 14 patients). The incidence during lockdown periods was noted to be lower, at 30 cases throughout the 12 months (quarterly average of 7.5 patients). In subsequent months following June 2021, the number of TA diagnoses dropped significantly, with an average of 2.1 patients per month until the end of the study period.

The above results can be explained by public behaviour relating to pandemic measures. Two large-scale studies utilised physical activity questionnaires to assess the impact of COVID-19 lockdowns on the population. Karageorghis et al [6] found that in the UK there has been an increase in sedentary behaviour with a marked reduction in physical activity. Spence et al [7] showed a similar trend, with only 31% of participants meeting guidance on daily physical activity. With advice to stay at home and most organised physical activities, such as sports and gyms cancelled, there was a lower incidence of TA injuries during lockdown periods. It has previously been demonstrated that sports such as football and tennis tend to be the main cause of TA ruptures [8, 9, 10]. Non-sporting related mechanism of injury was highest during the lockdown periods, at 40%, compared with 25% and 23.1% pre- and post-lockdown, respectively.

Following the end of the third national lockdown in March 2021, gyms opened and large-scale group sports were allowed again. As demonstrated in Figure 2, this coincided with a large rise the number of TA ruptures in the subsequent 3 months. The long period of altered physical activity trends, and subsequent return to sport and more rigorous exercise may have made patients more susceptible to TA injury. It has previously been demonstrated that seasonal and weather variation impacts incidence of TA ruptures, with peaks commonly occurring in Spring [10, 11]. A cumulation of these factors was likely responsible for the rise in cases noted.

There a further peak of TA rupture cases presenting in September 2020, as demonstrated by Figure 2. COVID guidelines and restrictions for that period have been assessed and there was no notable change of restrictions. Weather reports from September 2020 were also reviewed to determine if a relationship with warm weather could have prompted higher levels of outdoor physical activity. Although there were multiple days with above-average temperature levels that month, the weather was comparable to the preceding month of August, and no conclusion could be drawn regarding this peak in cases.

Patient demographics

The findings in our study of male preponderance to AT injury match those already established in literature [8, 9]. This was shown to be consistent throughout the study period.

The average patient age also remained constant during this time. The age group of 30–39-year-olds was shown to have the highest incidence of AT rupture remained consistent over the 37-month study period. It confirms previously published findings of high prevalence in this age group [8]. As represented in Figure

1, there was a higher proportion of AT injury in the 60–69-year-old group during lockdowns than throughout the pre- and post-lockdown period. This may perhaps be attributed to government advice to remain active during lockdown as a way of improving physical and mental health [12]. There was also a higher proportion in the 70-79-year-old prior to lockdown. Although AT rupture is classically associated with sporting injuries in the young and middle-aged population, increasing cases have also been observed in the elderly group; this is thought to be due to an a more active ageing population, and increased prevalence of underlying Achilles tendinopathy [13, 14]. Reduced proportion in this age group during and after social restriction may reflect a difficulty for this age group to return to physical activity after prolonged sedentary behaviour encouraged during the pandemic.

Management of injury

There was an increase in non-operative management during the lockdown period, at 83.3% of cases treated conservatively, compared with 64.3% and 58.5% pre- and post-lockdown, respectively. This is consistent with COVID recommendations made by the BOA to limit operative management and in-patient care where possible and safe to do so [5], as well as a globally observed drop in operative caseloads during the pandemic [15, 16], due to increased pressures of the coronavirus on healthcare system resources. Another factor which may have had an effect is patient choice and possible reluctance to be admitted to hospital and undergo an operation at times when coronavirus cases were at their peak.

The above trend did not continue as restrictions were lifted; the proportion of patients undergoing surgical management for TA rupture was higher in the post-lockdown period, at 41.5%, compared to the pre-lockdown and lockdown time periods (23.2% and 13.3%, respectively). Multiple studies have reported on surgeons' concerns regarding loss of operative volume and de-skilling secondary to the impact of the COVID-19 pandemic [17, 18, 19]. It is possible that surgeons were more inclined to offer surgical management in an attempt to make up for surgical volume loss throughout the peak of the pandemic.

Limitations

We recognise several limitations of our study. Data was sourced from a single orthopaedic unit; it would be beneficial to collect data from across multiple centres and produce larger-scale results. The retrospective nature of the study makes it more prone to bias and errors in how data was recorded at the time of clinical

encounters. Patient outcomes and how they may have been affected by the changing trends have not been examined; this is an important area for further study.

Conclusion

The COVID-19 outbreak and subsequent lockdowns had an impact on the incidence of TA ruptures and their management in our centre. There was a significant reduction in cases at times of social restrictions, followed by a surge in a short period of time once lockdown measures were lifted. Sport-related injury was the most likely cause of TA rupture, even during lockdowns, and there was a shift toward non-operative management during the restrictions. Further study into patient outcomes is warranted, as well as the way other pandemic-related changes to services may have had an impact on the management of TA injuries, such as the use of remote physiotherapy consultations. Furthermore, it would be interesting to observe trends in non-operative and surgical management in the future.

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