

Testosterone Replacement Therapy is Associated with Increased Odds of Achilles Tendon Injury and Subsequent Surgery: A Matched Retrospective Analysis

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INTRODUCTION:

Testosterone replacement therapy (TRT) was increased in the United States in recent years and though anabolic steroids have been associated with tendon rupture, there is a paucity of literature evaluating the risk of Achilles tendinopathy with TRT. This study aims to evaluate the associative relationship between consistent TRT and Achilles tendinopathy and subsequent surgery.

METHODS:

This is a one-to-one exact matched retrospective cohort study utilizing a national insurance database. Records were queried for patients who were prescribed at least 3 consecutive months of TRT between January 1, 2010 and December 31, 2019. Patients aged 35 to 75 years were included. Patients with a history of rheumatologic disease or cancer were excluded. These patients were matched to a control cohort on age, sex, Charlson comorbidity index, tobacco use, and diabetes. Achilles tendinopathy and Achilles tendon repairs were identified using ICD-9, ICD-10, and CPT billing codes. Incidence rates of newly diagnosed Achilles tendinopathy were calculated over a two-year period for both cohorts. Multivariable logistic regression was used to compare rates of Achilles tendinopathy, Achilles tendon repair, and revision repair in the overall cohort and individual sex- and age-specific cohorts. A p-value of < 0.05 was determined to represent statistical significance *a priori*.

RESULTS: A total of 423,278 patients who filled a TRT prescription for a minimum of 3 consecutive months were analyzed. The 2-year incidence of Achilles tendinopathy was 377.8 (95% CI, 364.8 – 391.0) per 100,000 person-years in the TRT cohort, compared to 245.9 (95% CI, 235.4 – 256.6) in the control (p < 0.001). The adjusted analysis demonstrated TRT to be associated with a significantly increased likelihood of being diagnosed with Achilles tendinopathy (aOR = 1.24, 95% CI, 1.33, p < 0.001). Of those diagnosed with Achilles tendinopathy, 287/3,198 (9.0%) of the TRT cohort subsequently underwent surgical repair for their injury, compared to 134/2,081 (6.4%) in the control cohort (aOR = 1.54, 95% CI, 1.19 – 1.99, p < 0.001). There was no difference in the rates of revision repair between the TRT and control cohorts (OR = 1.06, 95% CI, 0.69 – 1.63, p = 0.864).

DISCUSSION AND CONCLUSION:

There is a significant association between Achilles tendon pathology and prescription TRT, with a concomitantly increased rate of undergoing surgical management. These results provide insight into the risk profile of TRT and further research into the science of tendon pathology in the setting of TRT is an area of continued interest.

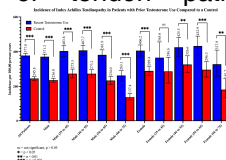
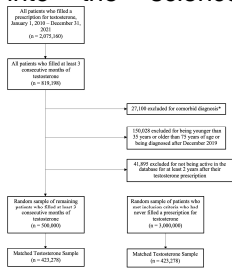


Table 1 Demographic comparison of the unmatched and matched cohorts.

Characteristic	Testosterone Cohort		Matched Cohort	
	Number	%	Number	%
Age (years)				
35-44	102,345	24.2	102,345	24.2
45-54	102,345	24.2	102,345	24.2
55-64	102,345	24.2	102,345	24.2
65-74	102,345	24.2	102,345	24.2
Sex				
Male	307,035	72.5	307,035	72.5
Female	116,243	27.5	116,243	27.5
Charlson Comorbidity Index				
0	102,345	24.2	102,345	24.2
1	102,345	24.2	102,345	24.2
2	102,345	24.2	102,345	24.2
3	102,345	24.2	102,345	24.2
4	102,345	24.2	102,345	24.2
5	102,345	24.2	102,345	24.2

Table 2 Unmatched and adjusted comparison of the likelihood of being diagnosed with Achilles tendinopathy in a two-year period.

Characteristic	Unmatched Cohort		Adjusted Analysis	
	Number of Patients (n%)	OR (95% CI)	Number of Patients (n%)	aOR (95% CI)
Age (years)				
35-44	102,345 (24.2)	1.00	102,345 (24.2)	1.00
45-54	102,345 (24.2)	1.00	102,345 (24.2)	1.00
55-64	102,345 (24.2)	1.00	102,345 (24.2)	1.00
65-74	102,345 (24.2)	1.00	102,345 (24.2)	1.00
Sex				
Male	307,035 (72.5)	1.00	307,035 (72.5)	1.00
Female	116,243 (27.5)	1.00	116,243 (27.5)	1.00
Charlson Comorbidity Index				
0	102,345 (24.2)	1.00	102,345 (24.2)	1.00
1	102,345 (24.2)	1.00	102,345 (24.2)	1.00
2	102,345 (24.2)	1.00	102,345 (24.2)	1.00
3	102,345 (24.2)	1.00	102,345 (24.2)	1.00
4	102,345 (24.2)	1.00	102,345 (24.2)	1.00
5	102,345 (24.2)	1.00	102,345 (24.2)	1.00

Table 3 Unmatched and adjusted comparison of the likelihood of subsequently undergoing surgical repair of Achilles tendinopathy.

Characteristic	Unmatched Cohort		Adjusted Analysis	
	Number of Patients (n%)	OR (95% CI)	Number of Patients (n%)	aOR (95% CI)
Age (years)				
35-44	102,345 (24.2)	1.00	102,345 (24.2)	1.00
45-54	102,345 (24.2)	1.00	102,345 (24.2)	1.00
55-64	102,345 (24.2)	1.00	102,345 (24.2)	1.00
65-74	102,345 (24.2)	1.00	102,345 (24.2)	1.00
Sex				
Male	307,035 (72.5)	1.00	307,035 (72.5)	1.00
Female	116,243 (27.5)	1.00	116,243 (27.5)	1.00
Charlson Comorbidity Index				
0	102,345 (24.2)	1.00	102,345 (24.2)	1.00
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4	102,345 (24.2)	1.00	102,345 (24.2)	1.00
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*See Supplemental Table 1.