

Anabolic Steroids, Testosterone and Tendon Rupture Risk

Overview

- Testosterone replacement therapy is associated with increased odds of surgically treated tendon rupture [1].
- Testosterone users had a 2.9-fold increased risk of tendon rupture compared to nonusers [2].
- It is premature to imply causation between testosterone replacement therapy and anterior cruciate ligament injuries based solely on existing results due to confounding variables [3].
- Clinicians should remain vigilant and prescribe testosterone replacement therapy judiciously with a thorough assessment of each patient's unique risk profile [3].
- There is a threshold-dependent relationship between testosterone levels and shoulder pathology [4].
- Hormonal status should be considered in musculoskeletal risk assessment [4].
- The use of prescription testosterone is associated with an increased likelihood of experiencing a distal biceps tendon injury [5].
- The use of prescription testosterone is associated with an increased likelihood of subsequently requiring surgical repair for distal biceps tendon injury [5].
- Patients with prior prescription testosterone exposure have an increased rate of distal biceps tendon injury compared with patients without such exposure [5].
- Patients with prior prescription testosterone exposure have an increased rate of biceps tendon repair compared with patients without such exposure [5].
- Surgeons should be more intentional about discussing endocrinologic history with patients [6].
- Surgeons should counsel patients with testosterone deficiency on the risks for injury or re-injury [6].
- Testosterone replacement therapy is associated with increased tendon rupture risk in men [7].
- Testosterone replacement therapy is not associated with increased tendon rupture risk in women [7].
- The lack of increased tendon rupture risk in women may be due to sex-specific differences in dosing [7].
- Patients who filled a prescription for testosterone replacement therapy were much more likely to experience a quadriceps muscle or tendon injury within 1 year of filling their prescription [8].
- Patients who filled a prescription for testosterone replacement therapy were at increased risk of undergoing surgical repair of the quadriceps tendon [8].

- Anabolic steroid use may contribute to pectoralis major rupture in body builders [9].
- Continuation of anabolic steroids during recovery from pectoralis major rupture does not seem to have a negative effect on functional recovery [9].
- Selective androgen receptor modulator (SARM) use is associated with tendon damage [10].
- Preoperative testosterone replacement therapy is a potential risk factor for complications after rotator cuff repair [11].
- Preoperative testosterone replacement therapy is a potential risk factor for reoperation after rotator cuff repair [11].
- Cessation of testosterone replacement therapy prior to rotator cuff repair should be considered on a patient-specific basis [11].

How It Works

- It is premature to imply causation between testosterone replacement therapy and ACL injuries based solely on existing results due to confounding variables [3].
- Clinicians should remain vigilant and prescribe TRT judiciously with a thorough assessment of each patient's unique risk profile [3].
- Findings suggest a threshold-dependent relationship between testosterone and shoulder pathology [4].
- The use of prescription testosterone is associated with an increased likelihood of experiencing a distal biceps tendon injury and subsequently requiring surgical repair [5].
- Patients with prior prescription testosterone exposure have an increased rate of distal biceps tendon injury and biceps tendon repair compared with patients without such exposure [5].
- Surgeons should be more intentional about discussing endocrinologic history with patients and counseling those with testosterone deficiency on the risks for injury or re-injury [6].
- TRT is associated with increased tendon rupture risk in men but not women [7].
- The association between TRT and increased tendon rupture risk in men but not women may be due to sex-specific differences in dosing [7].
- Testosterone therapy is associated with increased odds of quadriceps tendon injury [8].
- Anabolic steroids use may contribute to pectoralis major rupture injury [9].
- SARM use is associated with tendon damage [10].
- Cessation of TRT prior to rotator cuff repair should be considered on a patient-specific basis [11].
- Further research is needed to understand the mechanism by which testosterone increases the risk of reoperation after total shoulder arthroplasty [12].
- Prescription testosterone is associated with increased risk of infection-related and all-cause reoperations after primary total shoulder arthroplasty in male patients [13].
- Testosterone use is associated with a higher risk of both infection-related and all-cause reoperations after total shoulder arthroplasty [13].

- There is increased risk of rotator cuff tears (RCTs), rotator cuff repairs (RCRs), and subsequent RCRs in patients prescribed testosterone [14].
- The observed non-linear relationship between low testosterone levels and osteoarthritis risk suggests that maintaining optimal testosterone levels may be important for joint health [15].

What the Evidence Shows

- The use of prescription testosterone is associated with an increased likelihood of subsequently requiring surgical repair of the distal biceps tendon [5].
- TRT is associated with increased tendon rupture risk in men [7].
- TRT is not associated with increased tendon rupture risk in women [7].
- The association between TRT and tendon rupture risk may be due to sex-specific differences in dosing [7].
- Anabolic steroids use may contribute to pectoralis major rupture [9].
- SARM use is associated with increased muscle mass [10].
- SARM use is associated with hepatotoxicity [10].
- SARM use is associated with cardiotoxicity [10].
- SARM use is associated with androgenic side effects throughout the body [10].
- Supplemental testosterone increases the risk of reoperation after total shoulder arthroplasty [12].
- Further research is needed to understand the mechanism by which testosterone increases the risk of reoperation after TSA [12].
- Prescription testosterone is associated with an increased risk of infection-related reoperations after primary total shoulder arthroplasty in male patients [13].
- Prescription testosterone is associated with an increased risk of all-cause reoperations after primary total shoulder arthroplasty in male patients [13].
- There is an increased risk of rotator cuff tears (RCTs) in patients prescribed testosterone [14].
- There is an increased risk of rotator cuff repairs (RCRs) in patients prescribed testosterone [14].
- There is an increased risk of subsequent rotator cuff repairs (RCRs) in patients prescribed testosterone [14].
- Four randomized controlled trials found that testosterone supplementation improved clinical outcomes in orthopaedic surgeries [17].
- Four randomized controlled trials found that testosterone supplementation improved body composition in orthopaedic surgeries [17].
- Four randomized controlled trials found that testosterone supplementation improved bone mineral density (BMD) in orthopaedic surgeries [17].
- Evidence regarding orthopaedic perioperative use of testosterone replacement therapy is heterogeneous [17].

- Patients prescribed at least 3 months of TRT had a significantly higher incidence of ACL injuries compared to controls within a 2-year follow-up period [18].
- Injectable TRT use within 1 year of primary ACL reconstruction is associated with a 3.3-fold increase in ACLR revision rates with 2 years of follow-up [19].
- Data regarding the safety of testosterone supplementation and its association with stroke in young adults remains limited and underexplored [20].

Practical Considerations

- The association between testosterone replacement therapy and increased tendon rupture risk in men but not women may be due to sex-specific differences in dosing [7].
- Anabolic steroid use may contribute to pectoralis major rupture [9].
- Prescription testosterone is associated with increased risk of infection-related reoperations after primary total shoulder arthroplasty in male patients [13].
- Prescription testosterone is associated with increased risk of all-cause reoperations after primary total shoulder arthroplasty in male patients [13].
- Authors suggest future areas of investigation that may provide guidance on how surgeons can mitigate adverse risks while optimizing benefits of testosterone replacement therapy in the orthopaedic patient [16].

Key Evidence

- [L3] Testosterone replacement therapy is associated with increased odds of surgically treated tendon rupture. [1] ([10.1177/2325967125s00009](#))
- [L3] Testosterone users had a 2.9-fold increased risk of tendon rupture compared to nonusers. [2] ([10.1177/2325967124s00339](#))
- [L5] It is premature to imply causation between testosterone replacement therapy and ACL injuries based solely on existing results due to confounding variables; clinicians should remain vigilant and prescribe TRT judiciously with a thorough assessment of each patient's unique risk profile. [3] ([10.1016/j.arthro.2024.11.086](#))
- [L3] These findings suggest a threshold-dependent relationship between testosterone and shoulder pathology and highlight the need to consider hormonal status in musculoskeletal risk assessment. [4] ([10.1016/j.jse.2026.01.012](#))
- [L3] Patients with prior prescription testosterone exposure have an increased rate of distal biceps tendon injury and biceps tendon repair compared with patients without such exposure. [5] ([10.1016/j.jse.2023.02.122](#))
- [L5] The author advises surgeons to be more intentional about discussing endocrinologic history with patients and counseling those with testosterone deficiency on the risks for injury or re-injury. [6] ([10.1097/corr.0000000000002835](#))

- [L3] TRT is associated with increased tendon rupture risk in men but not women, potentially due to sex-specific differences in dosing. [7] ([10.1177/23259671261430731](#))
- [L3] Patients who filled a prescription for testosterone replacement therapy were much more likely to experience a quadriceps muscle or tendon injury within 1 year of filling their prescription and were at increased risk of undergoing surgical repair of the quadriceps tendon. [8] ([10.1097/corr.0000000000002744](#))
- [L4] Anabolic steroids use may contribute to the injury, but continuation during recovery does not seem to have a negative effect on functional recovery. [9] ([10.1186/s12891-023-06382-1](#))
- [L4] SARM use is associated with increased muscle mass, hepatotoxicity, cardiotoxicity, tendon damage, and androgenic side effects throughout the body. [10] ([10.1177/03635465241252435](#))
- [L3] Cessation of TRT prior to rotator cuff repair should be considered on a patient-specific basis. [11] ([10.1016/j.jseint.2025.10.002](#))
- [L3] Further research is needed to understand the mechanism by how testosterone increases the risk of reoperation after TSA. [12] ([10.1177/2325967124s00118](#))
- [L2] Testosterone use is associated with a higher risk of both infection-related and all-cause reoperations after total shoulder arthroplasty. [13] ([10.1016/j.jseint.2026.101634](#))
- [L3] There is increased risk of RCTs, RCRs, and subsequent RCRs in patients prescribed testosterone. [14] ([10.5435/jaaos-d-22-00554](#))
- [L3] The observed non-linear relationship suggests that maintaining optimal testosterone levels may be important for joint health. [15] ([10.1186/s12891-024-08272-6](#))
- [L5] The authors suggest future areas of investigation that may provide guidance on how surgeons can mitigate adverse risks while optimizing benefits of TRT in the orthopaedic patient. [16] ([10.5435/jaaos-d-23-00348](#))
- [L2] Although evidence regarding orthopaedic perioperative use of testosterone replacement therapy is heterogeneous, 4 randomized controlled trials reviewed here found that testosterone supplementation improved clinical outcomes, body composition, and BMD. [17] ([10.1016/j.arthro.2024.12.026](#))
- [L3] This study found that patients prescribed at least 3 months of TRT had a significantly higher incidence of ACL injuries compared to controls within a 2-year follow-up period. [18] ([10.1016/j.arthro.2024.10.032](#))
- [L3] Injectable TRT use within 1 year of primary ACLR is associated with a 3.3-fold increase in ACLR revision rates with 2 years of follow-up. [19] ([10.1177/23259671251399845](#))
- [L4] The review highlights that while testosterone supplementation is increasing, data regarding its safety and association with stroke in young adults remains limited and underexplored. [20] ([10.3389/fneur.2024.1422931](#))

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