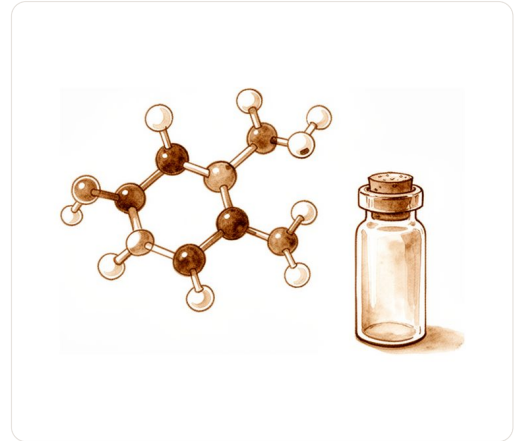


Anabolic Steroids, Testosterone and Tendon Rupture Risk



Testosterone influences muscle and bone; levels and supplementation carry musculoskeletal implications worth understanding.

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What you're feeling

You may notice pain in your shoulder or other joints. Your doctor might check your hormone levels because low testosterone is linked to a higher risk of wear-and-tear arthritis. This relationship is complex, but maintaining healthy levels is important for joint health. If your levels are too low, your joints may feel stiffer or ache more than usual.

You might find that certain movements become difficult or painful. Reaching behind your back to fasten a bra or tucking in a shirt can be challenging. Lifting objects overhead may trigger sharp pain or a feeling of weakness. These symptoms often flare up after activity or at night, making it hard to sleep on your side. You may also feel general fatigue or notice changes in your muscle strength.

Be aware that testosterone therapy can change how your body responds to injury. Using testosterone or anabolic steroids is linked to a higher risk of tearing tendons, such as those in the rotator cuff, biceps, or quadriceps. You might experience a sudden pop or pain if a tendon ruptures. This risk is higher in men using testosterone replacement therapy. If you have had shoulder surgery, testosterone use is also associated with a higher chance of needing another operation or dealing with an infection.

Your doctor will discuss your hormone history with you. They will help you understand your unique risk for injury or re-injury. If you are considering testosterone therapy, it is important to weigh these risks carefully. Your medical team needs to know about any supplements or prescriptions you are taking to keep you safe during recovery.

What's actually happening

Testosterone acts like a switch for your body's tissues, but it does not always turn things on smoothly. Your doctor looks at your hormonal levels because they directly affect your muscles, bones, and tendons. Think of your tendons as thick ropes that connect muscle to bone. When testosterone levels are too low or fluctuate wildly, these ropes can become brittle. They lose their natural elasticity and become more likely to snap under normal stress.

This brittleness explains why you might face a higher risk of tendon ruptures. Studies show that testosterone users have a 2.9-fold increased risk of tendon rupture compared to nonusers. This includes common injuries like rotator cuff tears in the shoulder or distal biceps injuries in the arm. The tissue simply cannot handle the load it used to. It is not just about strength; it is about the quality of the connective tissue itself.

Your joints also rely on this balance. Cartilage is the smooth coating on the ends of your bones that allows them to glide without friction. Low testosterone levels are linked to a higher risk of wear-and-tear arthritis (osteoarthritis). The relationship is complex, but maintaining optimal levels helps keep this protective layer healthy. Without it, the bone ends can rub together, causing pain and stiffness.

There is also a risk of infection and reoperation after joint replacement surgery. Testosterone use is associated with a higher risk of infection-related reoperations after primary total shoulder arthroplasty in male patients. It also increases the risk of all-cause reoperations. Your doctor needs to know your full history to manage these risks. They will assess your unique profile to decide if hormone therapy is safe for you. This careful planning helps protect your long-term joint health and reduces the chance of needing another surgery.

What we can do about it

Start with self-care and physical therapy. Your doctor may recommend specific exercises to strengthen the muscles around your joints and tendons. This helps support the area and reduces strain. You should give this approach enough time to work, typically several weeks. Consistency is key. Gentle movement often helps more than rest alone. Avoid activities that cause sharp pain. Listen to your body and stop if something feels wrong. This foundation is the first step in managing your symptoms safely.

Medical management involves medication and hormone therapy. For pain, your doctor might suggest anti-inflammatory drugs. These help reduce swelling and discomfort. If you have low testosterone, your doctor will discuss hormone therapy carefully. Testosterone replacement can improve body composition and bone density after surgery. However, it carries risks. It is linked to a higher chance of tendon ruptures, including in the biceps and quadriceps. Users face a 2.9-fold increased risk of tendon rupture compared to nonusers. There is also an increased risk of rotator cuff tears and repairs. Your doctor will weigh these benefits against the risks based on your unique health profile. Do not start or stop hormone therapy without medical guidance.

Seek specialist input if symptoms persist or worsen. If self-care and medication do not help, your doctor may refer you for further assessment. In some cases, a procedure might be considered to repair damaged tissue. For example, if you have a pectoralis major rupture, surgery may be needed. Interestingly, continuing anabolic steroids during recovery from such a rupture does not seem to negatively affect functional recovery. However,

testosterone use is associated with increased odds of surgically treated tendon ruptures. Your doctor will determine if a procedure is necessary based on your specific injury and overall health. Always follow their advice closely to ensure the best outcome.

What to expect

Your doctor will look at your hormonal health as part of your overall injury risk. Testosterone levels have a specific threshold linked to shoulder problems. Low levels are also tied to a higher risk of wear-and-tear arthritis. Keeping your levels in a healthy range may help protect your joints. However, if you have low testosterone, you should know that it can increase your risk of injury or getting hurt again.

You need to be aware of specific risks if you are taking testosterone or anabolic steroids. These medications are linked to a higher chance of tendon ruptures. For example, users have a 2.9-fold increased risk of tendon rupture compared to nonusers. You are also more likely to injure your distal biceps tendon or need surgery to repair it. There is also a higher risk of rotator cuff tears and needing subsequent repairs. If you take testosterone replacement therapy, you are much more likely to suffer a quadriceps muscle or tendon injury within one year of filling your prescription. This may lead to surgical repair.

There are also potential benefits in certain surgical contexts. Some studies show that testosterone supplementation can improve body composition and bone density after orthopaedic surgery. It may also improve clinical outcomes. If you have a pectoralis major rupture, continuing anabolic steroids during recovery does not seem to negatively affect your functional recovery.

It is important to discuss your endocrinologic history with your doctor. They will assess your unique risk profile before prescribing any treatment. While some data suggests a link between testosterone replacement and anterior cruciate ligament injuries, it is too early to say for sure due to other factors. Similarly, data on stroke risk in young adults remains limited. Your doctor will counsel you on these risks to help you make informed decisions about your musculoskeletal health.

In more depth

This section goes a step deeper into the biology, at a student level. It is not needed to make a decision about treatment, but it explains why anabolic steroids and testosterone change the way tendons behave.

HOW ANDROGENS CHANGE TENDON AND COLLAGEN

Tendons are built mostly from **type I collagen**, made and maintained by cells called fibroblasts that carry androgen receptors. At normal (physiological) testosterone levels, androgens help keep that collagen healthy. At the very high levels seen with anabolic-androgenic steroid use, the collagen laid down tends to be more disorganised, with smaller, less uniform fibres and altered crosslinking. The result is a tendon that is stiffer and less elastic, and that can fail at a lower stretch than normal tendon.

WHY STEROID USERS RUPTURE TENDONS

Anabolic steroids build muscle quickly, so the muscle can generate more force, while the tendon it pulls on does not strengthen at the same rate and may even be weakened. This mismatch (a strong muscle pulling on a relatively weaker tendon) is thought to be why steroid users suffer sudden tendon ruptures, often during a single heavy effort and frequently at the point where muscle meets tendon. Commonly affected sites include the rotator cuff and biceps in the arm, and the quadriceps and Achilles in the leg. Across studies, testosterone or steroid use is associated with roughly a threefold higher risk of tendon rupture than in non-users.

TRT VERSUS ANABOLIC STEROID USE

It helps to separate two different things. **Testosterone replacement therapy (TRT)** aims to restore a low level back into the normal range, under medical supervision. **Anabolic-androgenic steroid use** involves doses many times higher than the body would ever make, often with several drugs combined. Most of the dramatic connective-tissue effects come from that high-dose, unsupervised pattern, and the tendon risk appears to rise with the dose. Replacement-dose TRT carries a smaller and less certain risk, which is one reason it is monitored.

BONE, CARTILAGE AND SURGERY

Androgens are not all harmful to the musculoskeletal system. Testosterone supports **bone density**, and a low level is linked with a higher risk of osteoporosis and possibly wear-and-tear arthritis. After some operations, testosterone can improve muscle bulk and bone. Set against this, steroid and testosterone use has been linked with higher rates of infection and repeat surgery after shoulder replacement. This mix of benefit and risk is exactly why your surgical and medical team need to know your full hormone and supplement history.

When to see someone

See your GP if you have persistent pain that does not improve with rest. Ask for a specialist review if you notice weakness or instability in your joints. Seek care for locking or giving way sensations. Contact your doctor if symptoms interfere with your sleep or work. Go to urgent care for sudden worsening of pain. Be aware that low testosterone levels are linked to an increased risk of osteoarthritis, also known as wear-and-tear arthritis.

Testosterone therapy may increase the risk of tendon ruptures, including injuries to the rotator cuff, biceps, and quadriceps. It is also associated with a higher chance of anterior cruciate ligament injuries. Your doctor should discuss your hormonal history to assess these risks.