

THE THROWING SHOULDER, AND WHAT HAS CHANGED IN IT

Adaptation or *Loss*

A throwing shoulder is not a normal shoulder and is not supposed to be. Some of what looks like a deficit is bone that adapted and cannot be stretched. Some of it is tissue that shortened and should be addressed. Telling them apart is one measurement, and most people take the wrong one.

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Comparing the throwing shoulder to the other one and treating the difference as damage is the most common assessment error in baseball. **Most of that difference is why he can throw.**

Years of throwing remodel the arm bone itself, which is what buys a pitcher the external rotation everyone else lacks. That adaptation shows up on a screen as a loss of inward rotation, and it is not reversible, not pathological, and not a target. Underneath it there may or may not be a genuine tissue restriction that is worth treating. One number separates those two situations and it is not the one usually reported.

What actually changes in a throwing arm

The bone itself

HUMERAL RETROVERSION

The arm bone twists slightly over years of throwing, particularly during adolescence. That twist is **what gives a pitcher his layback**. The whole rotational arc shifts toward external rotation: more one way, less the other. It cannot be stretched, should not be treated, and an athlete who developed less of it has a lower ceiling permanently.

The back of the capsule

POSTERIOR TIGHTNESS

Repeated deceleration loads the back of the joint, and the tissue there can thicken and shorten. This **is** treatable and is the part worth finding. It presents as lost inward rotation, exactly like the bony adaptation does, which is the source of the confusion.

The muscles

POSTERIOR CUFF AND LAT

Tone and length changes in the muscles that decelerate the arm and the ones that drive it. Responds to soft tissue work and loading, and often accounts for a chunk of what gets attributed to the capsule.

Acutely, after throwing

LAXITY

Measured right after pitching, external rotation and total motion **increase**. That is temporary tissue laxity rather than improvement, and it is the window in which the joint is least protected. Screening immediately post outing measures the wrong thing.

The measurement that separates them

THE NUMBER USUALLY TAKEN

Inward rotation, throwing side against the other

A deficit here is real and tells you almost nothing on its own, because **both a healthy adaptation and a genuine restriction produce it**. The bone rotating the arc one direction looks identical, on this test, to tissue holding it back.

Treating every deficit found this way is how athletes end up being stretched into a bony end range for months with nothing to show for it.

THE NUMBER TO TAKE INSTEAD

Total rotational motion, both sides

Add inward and outward rotation together for each shoulder and compare the **sums**. A shifted arc keeps its total. A restriction reduces it.

- **Total similar, arc shifted** — bony adaptation, leave it alone
- **Total notably lower on the throwing side** — something is genuinely restricting, and that part is worth treating

Same two goniometer readings you were already taking. Different arithmetic, different conclusion.

The second test that confirms it

Run rotation twice: once with the shoulder blade free, once with it held down against the table. A large difference between the two means the **shoulder blade** is supplying or limiting the motion rather than the joint. That points at the scapular work in *Allowed, Not Made* rather than at the capsule.

Then note the end feel. Soft and springy is tissue you can change. Hard, early and abrupt is structure, and the correct response is to build around it.

What a real restriction does downstream

Worth knowing, because it explains why this is not just a shoulder question.

TRUNK

The chest starts compensating

Lost shoulder rotation has been associated with altered trunk compensation patterns. The rotation has to come from somewhere, and the trunk is the nearest supplier.

LEGS

Even the knee changes

Documented alteration in knee kinematics during the pitch in throwers with rotation deficits. The whole chain reorganises around a restricted shoulder, which is a useful reminder that faults do not stay local.

ARM

Layback is capped

Whatever the cause, less available rotation means less layback, and less real layback is associated with *more* elbow load because the arm reverses over a shorter arc.

BLADE The shoulder blade compensates first Before the trunk gets involved, the blade tries to make up the difference. That is where winging and altered tilt frequently come from, and it costs subacromial space.	INJURY It travels with other findings Rotation deficits rarely appear alone. They come alongside posterior cuff weakness, scapular control problems and workload history, which is why a single measurement should not drive a whole intervention.	TIMING It gets worse across a season Adaptation and restriction both accumulate with throwing volume. A number taken in February and never repeated is a number about a different athlete.
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What to do, by finding

FINDING A

Total motion preserved, arc shifted

This is a normal throwing shoulder. The inward rotation deficit is the price of the outward rotation he throws with.

- **Do not stretch it.** There is nothing there to lengthen
- Keep measuring across the season so a genuine change would be visible against his own baseline
- Spend the time on posterior cuff strength and shoulder blade control instead, which are always worth doing

FINDING B

Total motion reduced, soft end feel

A genuine restriction, and the one worth working on. Establish what tissue before choosing a method.

- **Soft tissue work** on the posterior cuff and lat first, since muscle accounts for more of this than capsule usually gets credit for
- Targeted mobility only if the restriction is genuinely capsular, and reassess by total motion rather than by feel
- **Strengthen through whatever range comes back.** Range without control regresses inside a week
- Recheck total motion, not inward rotation alone, or you will not be able to tell whether it worked

FINDING C

Hard, early end feel

Bone. Build the delivery around what he has.

- Stop trying to gain range at that joint
- Look at whether the **shoulder blade** can contribute more, since it supplies a real share of apparent rotation
- Look downstairs. Layback is produced by trunk rotation, and a lower half that delivers more can partly offset a shoulder that offers less

ALWAYS

Measure at the right time

The number moves for reasons that have nothing to do with the athlete's true state.

- **Not immediately after throwing**, when the joint is acutely lax and reads better than it is
- Same time of day, same position, same examiner where possible
- Repeat across the season rather than once in the spring

Where this sits in the library

This is the structural half of the layback question

Allowed, Not Made lists forty two reasons layback comes up short, and one whole group of them is structure that cannot be trained. This document is how you find out whether the athlete is in that group before spending months on the ones that can.

The relationship runs the other way too: a restriction found here shows up as a lower ceiling there, and the correct response is the same one *Deficiency or Adaptation* argues for throughout. **Build around what he has rather than chasing a number he was never going to reach.**

Sources

- Effect of Glenohumeral Internal Rotation Deficit on the Shoulder During Fastball Pitching
- The Relationship between Glenohumeral Internal Rotation Deficit and Trunk Compensation Movement in Baseball Pitchers

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- [The potential impact from glenohumeral internal rotation deficit to the knee kinematics in baseball pitchers](#)
 - [Baseball pitcher shoulder rehabilitation protocol](#)
 - [Bullock, Nicholson et al. — Baseball pitching biomechanics in relation to pain, injury, and surgery](#)
 - [Fleisig et al. — Kinematic Parameters Associated With Elbow Varus Torque in Elite Adult Baseball Pitchers](#)
 - [Manifestations of muscle fatigue in baseball pitchers: a systematic review, acute range changes](#)
 - [ASMI — The Clinician's Guide to Baseball Pitching Biomechanics](#)
 - [Rehabilitative and Preventive Effects of the Thrower's Ten Program in Overhead Athletes](#)
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Add the two numbers together before deciding anything. A shifted arc keeps its total, and a restriction does not.