

## Tension and Compression – How to Tell the Difference

### White Crow Yoga

**Don't try to read all of this at once. Read a section, let it sink in, then come back later and read some more. Read it multiple times if this material is new to you.** I've studied anatomy and kinesiology for nearly 4 decades and I'm trying to give you as much of this knowledge as I can in a few pages/hours. Don't get overwhelmed. Read a little, take a break!

In our RYT200 program, we study Paul Grilley's anatomy materials. **This teaches us that we stop in a pose due to:**

**1) Tension:** Our soft tissues won't allow us to go deeper into the pose. For example, if my hamstrings are tight, I might not be able to touch my hands to the floor in Uttanasana. If I work on this with consistent practice, this can change.

**2) Compression:** We hit our limit due to compression. Our bones ran into each other and we had to stop the movement. For example, in Baddha Konasana, if there's not enough space in my acetabulum (hip socket) for my femur to freely move, I will never get my knees to the ground in Baddha Konasana, no matter how flexible my adductor (inner thigh) muscles become. This will not change with any amount of practice.

**Of course, it could also be:**

**3) A conscious choice.** We stopped because we only wanted to go part of the way into the pose, using a gentle approach. We will take this out of the equation and look at tension and compression.

### **How do we know if it is tension or compression?**

**It might not matter for a new student.** If they are newbies, let them find their edge and don't push past it. It could be tension. It could be compression. Let them practice 6 months and then we can decide. At this early stage, we won't know which it is because they likely have some of BOTH.

For example, in Baddha Konasana, if I can't get my knees anywhere near the ground as a new student, it could be due to soft tissue limitations. After I practice consistently a few months, if I still can't go anywhere near the ground, now I've probably run into compression. In some poses, it doesn't really matter at this early stage which it is. Students have to work through the tension limitations to FIND their compression limitations. The 'work' you give them won't differ because they must work through tension before they would hit any compression limits.

**If a student has consistently practiced for 6 months or longer doing a variety of postures where he challenged himself to move to his edge, he probably has worked through his tension (or at least most of it), so he will now hit compression.** This isn't always the case, but most often it will be, if he has dedicated an hour or so several times a week to a practice.

Now that he's moved past his tension, what's left that limits him is compression. Let's go back to Baddha Konasana. Maybe in the early days of his practice, his knees were 8 inches off the ground. After 6 months of consistent practice, he has worked through his tension and now his knees are 3 inches off the ground. These 3 inches very likely represent compression. This means his acetabulum and femur head are running into each other, and he can't go any deeper. (Note: This conversation revolves around a healthy person. Injuries and diseases will impact our movement and that's a different conversation.)

**A big part of this is awareness! Ask your student where they are feeling stuck.** Does it feel like the inner thigh muscles are tight, and that's what stops them from going deeper in Baddha Konasana, or does it feel like the joint? If they feel the inner thigh muscles are tight, this is likely tension.

**OK, he's practiced as outlined above and still hit a limit. How do I really know it is compression?**

Unless you have an x-ray, you can't be 100% sure, but I think you can make an educated guess. In addition to the above guidelines, let's dig a little deeper to see if it is tension or compression.

Let's look at Baddha Konasana again. First, the above guideline (consistent practice) will usually be on target. But here's another way to look at it: Have the student practice another posture that puts the bones in a different position, yet still asks the same muscles to perform the same actions.

**In Baddha Konasana, let's say that we are suspicious that the acetabulum and femur are hitting each other, creating compression, but we want to rule out tension in the inner thighs (hip adductors).**



We can do this by **looking at other poses that use the same muscle groups using a different bone position.** Obviously, if you look at a pose that asks the muscles AND bones to do the same thing as the pose where you found the limitation, you'll find the same limitation because nothing has changed. You haven't ruled out tension or compression. In our example, Tree pose should show the same limitations as Baddha Konasana because you are asking the bones and muscles to do the same thing.

**Let's look at where we are using the muscles in the same way - but have the bones positioned differently. If we get the bones out of the way and don't see the limitation anymore, we have a good idea that it is compression.**

**Look at Warrior 2.** Do you feel a good stretch of the inner thigh muscles on the front leg? Does it feel fairly free and easy, or do you feel tight? If your inner thigh feels flexible in Warrior 2, but you were not able to get anywhere near the ground in Baddha Konasana, this is an indication of compression. Look at the hip joint position of the front leg. You are not asking it to open as much, so you remove the likelihood of hitting compression.

**If the issue was tension in the inner thigh, you'd also feel tightness in the adductors of the front leg in Warrior 2.** If you have a limitation in Baddha Konasana, but Warrior 2 is easy for you, it's probably because the bone is in a different position, so you aren't bumping against bone. Granted, the inner thigh stretch may not be as intense in Warrior 2 as in Baddha Konasana, but you should still notice some tension if muscle tightness is the issue.



**Let's look at another pose to see if we are hitting tension or compression in Baddha Konasana.** Your Ray Long *Key Poses of Yoga* book (used in the RYT200) shows you a psoas and quad stretch that also stretches the adductors (the longus and magnus, in this case). However, the hip joint is in a forward position, so if you are hitting bone on bone in Baddha Konasana, you are not going to encounter the same movement in the joint in the quad stretch (You could potentially hit bone on bone in a different area, but I don't often see this.). **If you have tension in the adductors (tension), you'll struggle with the back leg in this pose because if the adductors are pulling tightly, it'll be difficult to get the psoas and quad to get into position.** This means you will struggle in the pose because the inner thighs will feel tight (tension).



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To reiterate:

**If the muscles still struggle - no matter which bone position we are in - there's a really good chance this is tension.**

**On the other hand, if you change the bone position and suddenly the muscles can reach a greater range of motion or do not feel tight (because you've removed the bony compression issue), then you know you were likely experiencing compression in Baddha Konasana.** Why? Again, when you moved the bones in a different way, you could stretch the muscles with no problem. But, in Baddha Konasana you could not get a deep stretch because the bones hit each other before you could reach your full ROM (range of motion).

### **Why does it matter if it is tension or compression?**

**The poses we offer or cues we offer may vary based on whether the limitation is tension or compression.**

**Acceptance:** Students need to know that they are hitting compression and work to maturely accept these limitations. Our cues should reflect this. Let's stop struggling to 'get somewhere' such as into the full expression of Hanumanasana (splits) or knees to the ground in Baddha Konasana. Examine the ego. Why is it important to get to a certain position? There are huge lessons in this exploration. We don't learn much from things that come easily to us. We learn from things that challenge us. If a pose challenges me, it gives me an opportunity to explore. Am I getting attached to the outcome of the pose? Is my ego imposing expectations upon me? If we can begin to accept ourselves on the mat, maybe we can begin to enjoy more acceptance off the mat.

Using our Baddha Konasana example again: I once had a student who consistently practiced with me. In Baddha Konasana one day, I said something like, "If we have been consistently practicing for several months and can't get our knees close to the ground, our bone structure may be limiting us. Let's see if we can practice acceptance without struggling to create change where it might not be possible. If we can learn acceptance on the mat, can we explore acceptance off the mat?" After class, my student came to me with tears in his eyes and thanked me for saying this because he realized in that moment that he was struggling off the mat to change things that he had no control over. He had an 'ah ha' moment that had nothing to do with the posture. **That's what yoga is about!**

**Pose Selection and Cues:** There are 2 other reasons why it matters if the limitation is tension or compression. One is posture selection. The other is how I cue. This takes a lot of explanation, so read this when you are well rested and can think through it.

**Posture Selection:** As your yoga teacher, I should help you determine if you are getting the maximum benefit from a pose while remaining safe. I make sure you are in the ideal posture or the best expression of a pose for YOUR body. **I need to know WHY you are expressing the pose in a certain way so I can assist you (verbally and/or physically) or leave you alone, if you are already expressing the posture in your ideal way.**

If I am working as your yoga therapist or private yoga teacher, I might be trying to help you overcome an injury or create specific strength and mobility to improve sports performance. In these cases, you may need to know if your client is experiencing tension or compression.

Let's say that you have a client with back pain and a flattened lumbar curve. You tested hamstring flexibility by doing a supine hamstring test (attempting to raise the client's leg to 90 degrees – Supta Padangusthasana) and found the hamstrings are tight. We know that shortened, tight hamstrings can pull the pelvis into posterior tilt and cause back pain (if you are in the RYT300 program, see your Healthy Back Course).

**You should know that Down Dog stretches the entire back line of the body, including the hamstrings (learned in pose breakdown during RYT200). You might tell your client with tight hamstrings to do Down Dog. Great. Problem solved, right? Well....maybe....let's see.**

In Down Dog, we will get **more hamstring stretch** if the heels are on the ground, but let's say that our client can't do that. If we don't know WHY our client can't do it, we miss an opportunity to give him the most help possible.

Maybe you look at Down Dog and say, "Well, he can't get his heels to the ground because he's stretching his hamstrings to the max and reaching his tension limit. That's good. Let him keep working here because now I am helping him with hamstring flexibility."

**Not so fast. What if he has not yet reached his hamstring limit, but the reason he can't get his heels to the ground is due to either calf tension or bone compression at the ankle? If that's the case, you are probably not improving his hamstring flexibility much (if at all) because you are hitting another limit before the hamstring gets a good stretch.** So, if all you do is give him Down Dog and think you are helping his hamstring flexibility that may not work.

**How do I know if the reason he can't put his heels on the ground is hamstring flexibility, calf flexibility or ankle compression? I have to do several tests.**

**1) Think about your initial assessment.** In this case, you'd refer to the client's supine hamstring test we talked about earlier (or watch him do Supta Padangusthasana). If he could only get his leg to about 30-40 degrees, this will mean that he is likely to reach his hamstring limit very early in Down Dog. But, if he goes to 70-80 degrees, it starts to get iffy. We know he can't go to 90 degrees (or he would not be suffering from any flattening of the lumbar curve and back pain due to lack of hamstring flexibility, because 90 degrees indicates good hamstring flexibility), but if he can go around 65-80 degrees, this could be that in-between stage where "it's enough inflexibility to flatten the lumbar curve some and cause back pain, but it is not enough inflexibility to keep the heels off the ground in Down Dog." There is no set in stone number (such as 73 degrees, etc.) but this is a good guideline.

**2) Let's not stop with this one analysis though. Let's poke around some more. I assess multiple ways to find the most likely culprit because these are not cut and dry or set in stone. It takes logic, reasoning, and some intuition.**

**What else could be stopping his heels from going to the ground in Down Dog? Calf tension or ankle bone compression. Let's rule these out (or in).**

**Have your client try a standing Uttanasana. Have your client try Garland (Malasana) pose.**

We've already said that we know our client is tight in the hamstrings, so we don't expect them to go to the floor in Uttanasana, but are their hands somewhere around their ankles or closer to their knees? If the hands are around the knees, it is **very likely that the heels won't go to the ground in Down Dog due to hamstring tension. Why do I say this? Because in forward fold, I am not asking the ankle to dorsiflex as much as it does in Down Dog, so I have taken a lot of the bony compression possibility off the table. But let's keep exploring.**

We said a person might not get the heels to the ground in Down Dog could be calf tension or ankle compression. All calf stretches require dorsiflexion of the ankle. Full ankle dorsiflexion requires good clearance of the bones in the ankle in relation to the foot, and also good calf flexibility.

In dorsiflexion, if you have a bone hitting another bone (a bone in the ankle hits a bone in the foot), you might not get to your fullest muscle length in the calf because there is no way to take this out of the equation. But, we can still do a couple of tests that might give us an indication. Of course, calf tension or bone compression in the ankle can be a reason why the heels don't go to the ground in Down Dog.

Try Garland Pose. This doesn't require much hamstring flexibility but does require calf flexibility and dorsiflexion. **If your client can easily do Garland Pose with heels to the ground, you have ruled out compression of the ankle and calf tightness as reasons why your client's heels won't go to the ground in Down Dog. This means Down Dog is probably a great hamstring stretch for your client,** because it is likely that hamstring flexibility is what is limiting his pose. If it was ankle compression or calf tension, he could not do Garland Pose.

**If your client cannot get his heels to the ground in Garland pose, there is a good chance that this stems from either tension in the calf or compression in the ankle** because this pose does not require a lot of hamstring flexibility. **This means that if you are offering your client Down Dog as a hamstring stretch, they are likely NOT reaching their full potential in the hamstrings, because they are hitting another limitation BEFORE the hamstring has reached its max potential.** You'd want to offer an additional pose (you could offer Down Dog, too, but you'd also need to offer something else to reach the max potential in the hamstrings).

**In summary, if our client can't get the heels to the ground in Down Dog, this is determining whether it is tension or compression might impact what we offer our client to improve their hamstring flexibility:**

- 1) Let's assume the client gets the heels down in Garland pose but the hands are near the knees in standing forward fold. The limitation is likely in the hamstrings in Down Dog. **This means Down Dog is a good pose to work on hamstring flexibility for this client.**
- 2) The client gets the hands close to the ankles in standing forward fold (so the hamstrings are

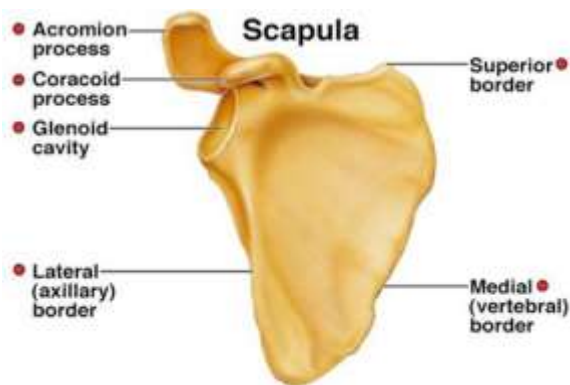
somewhat limited, but not extremely limited). The heels do not go to the ground in Garland pose. This indicates dorsiflexion issues (ankle compression or calf tension), which means the hamstrings are probably not the limiting factor in Down Dog. We know the hamstrings are tight, but we are hitting our limit in Down Dog BEFORE we get to our hamstring edge. **This means we could offer Down Dog, but also need to offer other hamstring stretches that remove the ankle dorsiflexion limitation, such as a supine hamstring stretch (Supta Padangusthasana).**

**Cues:** Remember I said there were 3 main reasons we may care if a pose is limited by tension or compression? Acceptance, Posture Selection and Cues. We've looked at the first 2. We know we should encourage acceptance. We know that once we set an intention (such as improving hamstring flexibility), our choice of poses will be impacted by tension and compression.

**Now, let's look at how cuing is impacted by our knowledge of whether a pose is limited by each of these factors.**

**Let's go back to Down Dog, but let's look at the shoulders this time and think about how the cue I give you may vary based on whether you are experiencing tension or compression** (or, if I see neither issue but you aren't expressing the pose fully – assuming you are not injured or purposely holding back - I have a chance to revise my cues in a way that resonates with you).

First, let's review information I shared with you about Paul Grilley's material (my summary of notes): The acromion process is a flattened ridge extending from the spine of the scapula. The size, angle and length of the acromion process will determine the angle of shoulder flexion before compression occurs. **Once compression occurs the scapula and clavicle will have to move in order to get greater shoulder flexion.** The acromion variations will affect poses such as Wheel and Downward Facing Dog anytime the arms are overhead in standing poses.



Stand up in Mountain or sit in Sukhasana. Now lift your arms overhead (flex your shoulders). Do your ears float between your biceps? If so, what did it take to get them there? As stated earlier, **the amount of scapula and clavicle movement needed to get the shoulders to flex enough to take the arms straight overhead varies depending upon the size, angle and length of the acromion process.**

**If I hear a teacher cue “ears floating between the biceps” in Down Dog, I know she is not considering shoulder variations.** If you can’t get your arms straight up (ears between the biceps) while seated/standing, why would you suddenly have the ability to do it in Down Dog? You wouldn’t! That’s why this I would not cue this. If I can’t get my arms straight overhead in Mountain, but you cue me to “let my ears float between my biceps” in Down Dog, do you know what that would encourage me to do if I had no anatomy/alignment knowledge? Drop my neck to get my ears to float between my biceps, which is poor alignment. Be careful with your cues. (Never repeat a cue you heard unless you understand the impact of that cue.)

First, how do I know if a person simply doesn’t understand the shoulder cue in Down Dog (so they aren’t moving through their full range of shoulder flexion) or if they are limited (tension or compression)? Have them shoulder flex from a seated pose or mountain. This takes any complication out of it and they should easily follow the instruction. If they can shoulder flex from a seated pose, but can’t do it from Down Dog, the might be a communication issue. Think of a new cue. Have the student do the movement seated and then tell them we are going to do this same shoulder movement in Down Dog.

**Next: Let’s assume they CANNOT lift the arms straight over head in a seated position or Extended Mountain. How do I know if it is tension or compression?**

If they lift the arms straight up, and do not try to abduct the arm somewhat to go around the acromion process and they do not try to put a big bend in the elbow (splaying the arms outward somewhat), but they can’t go straight overhead, this is likely tension. **If it was compression, they would naturally try to move around the bony sticking points. If they try to maneuver around it, it is likely compression.**

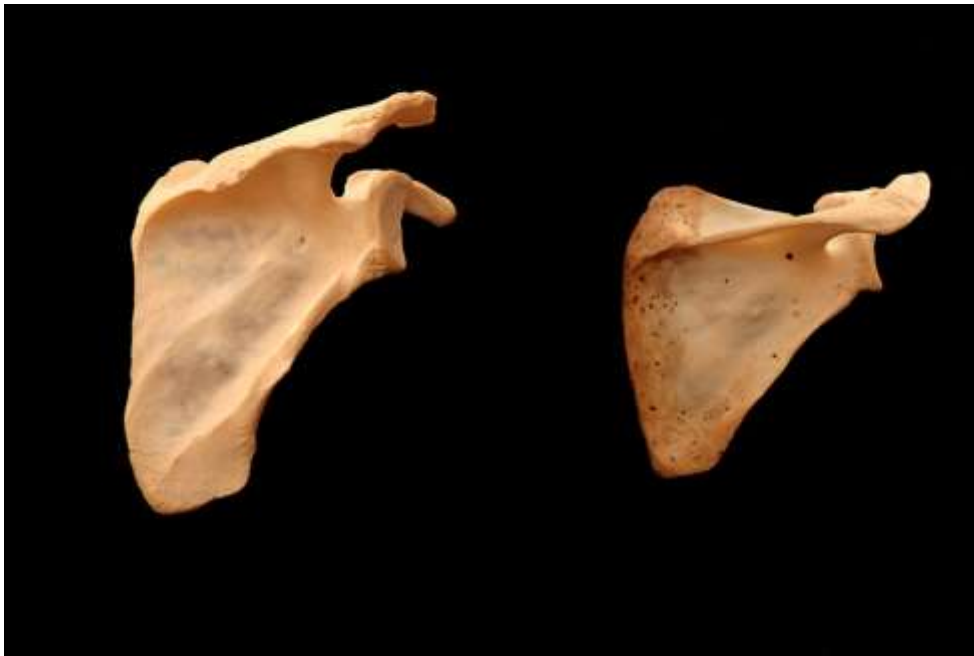
**Why does it matter if it is tension or compression?**

If it is tension, let them slowly work on increasing the ROM. You might focus more heavily on Extended Mountain or other simple overhead arm positions (Warrior 1, etc.). You won’t need to focus on cues that allow the compressed student to work around the acromion process (such as allowing the hands a little wider or elbows more bent) for these students. If it is compression, you’ll need to allow for modifications in Down Dog for the student to work around the bony compression.

Let’s look at some differences in the shoulder blades.



*Two right scapula from the back view. The acromion process on the left specimen doesn't cover the shoulder socket. Humerus abduction would vary tremendously. (Source: Paul Grilley)*



*Two right scapula. Left specimen could easily clasp hands behind the back. The acromion of the right specimen would block this movement. (Source: Paul Grilley)*



*Two left scapula. Acromion on left specimen doesn't cover shoulder socket, making it easy to raise arms past vertical. (Source: Paul Grilley)*

Look at the photo above. The scapula on the left will probably allow the student to take the arms way behind the ears when they lift the arms (flex the shoulders) from a standing position. The scapula on the right won't do that. IF the student is able to position the clavicle and scapula in a way that they can work around the acromion process, they may still get their arms overhead (or they may not) but it is likely to look different. **For example, the movement to get them to that position may require them to use more shoulder abduction during the transition from arms down by the side to arms overhead as they work around the bone compression or it may mean the elbows need to stay more bent to maintain that position.** Your cuing may have to change.

**What does this have to do with cuing in Down Dog?** Check out the possibilities.

**1) Compression:** Pay attention to how a student is raising her arms in a seated pose or in Extended Mountain. If you see that she can't get her arms **straight up** in these positions without widening the arms, slightly abduction the shoulders, bending the elbows deeply or otherwise working around the bony compression as we discussed earlier, then you can expect her to have to make modifications in Down Dog to allow for compression.

You still help her work on shoulder flexibility but what you are seeing in this circumstance is likely a bony compression which cannot change. We should think about what cues we are offering and whether or not these cues are helpful to a student with compression.

If you watched the student take the arms overhead from a seated or standing mountain posture

and noticed they either could not get their arms in alignment with their ears or to do so meant they had to work around the acromion process as we discussed earlier, then you may have to adjust your cues.

**For this student, if you cued, “Hands shoulder width apart, arms extended from Child’s Pose, etc.” this will not work well.** Here’s why: If they could not lift their shoulders overhead without moving around the bony compression, then they can’t put the hands shoulder width apart and expect to push up into Down Dog in the same way as someone without this limitation. **You might need to cue this person that it is ok to separate the hands a little more or to bend the elbows.** Watch the Paul Grilley video for a full explanation.

**2) Revise my cues:** If you see that the student can lift their arms straight overhead, maybe even behind the ears, without any alteration in movement (such as clavicle or scapular movement to work around the acromion process), then if they do not have ears between the biceps in Down Dog, you can cue them to move the shoulders. I still would not cue “ears between biceps” because that could indicate neck movement and what we want is shoulder movement. **So, because you watched them move before we went into Down Dog, you know that they are fully capable of getting the ears between the biceps. If they aren’t in the pose fully, this might be due to them not understanding the alignment and you have a chance to cue them into their fullest expression of the pose.** Ask yourself, “Am I using phrases or demonstrating in a way that allows them to understand the shoulder movement?”

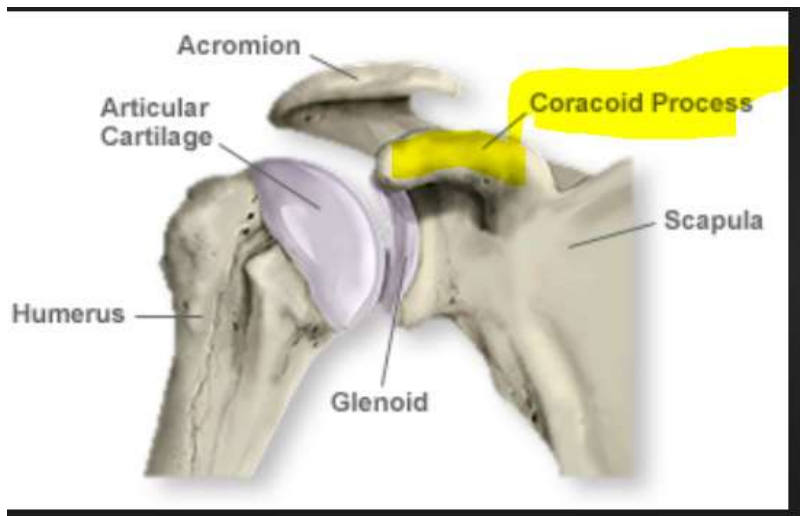
**Note:** Some students will actually have the chest even closer to the ground in Down Dog so the ears are actually closer to the mat than the biceps (you’ve gone beyond ears floating between the biceps). Watch the Paul Grilley video for more info on this. If you want to know if this is ok, basically the answer is, “It Depends!” Is this the person’s natural ROM in a natural, unforced manner? Is their mobility and stability even or are they creating more mobility and bypassing stability?

**3) Tension:** As stated earlier in this document, if it is tension, you probably won’t need to modify your cues to allow for wider hand placement or bent elbows. Simply continue to work on poses that increase shoulder flexion.

As you see, your choice of asana may be impacted by whether a pose limit is caused by tension or compression, and you also see that the way you do a pose can be impacted by tension or compression. Another great example of this is whether or not we choose to do Chaturanga, or, if we choose to do it, how we practice it. Let’s take a look before we close



*View of two right scapula. Coracoid process on the right specimen is slanted downward, more likely to pinch with humerus in Chaturanga (Source: Paul Grilley)*



Since we don't want to pinch the humerus (this may cause nerve impingement and pain), we would need to opt out of Chaturanga or modify it so the hands are wider and we may even let the elbows come out slightly. Don't let the elbows come out so far that you feel too internally rotated in the shoulder, but a slight releasing of the elbow and a slightly widening of the hand stance may allow the freedom to practice the pose without a high risk of injury.

As a side note, Chaturanga should not be practiced by beginners! It requires too much strength and nuance. Also, remember that a lot of where we get injured is coming into and out of the pose. I don't recommend using a jump back to come into Chaturanga unless you are extremely fit, aware, and have great shoulder mobility and strength. The same is true of going from

Chaturanga into Up Dog. Both of these require a lot of shoulder stability that is not available to many students.

Thanks for reading this. I know this is a lot to take in, but please read it multiple times and review it in chunks.