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Watch Your Biomechanics

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As a student, I can remember sitting in a kinesiology class where we were learning about the facet joints of the spine. The instructor made a comment about how these were not designed to be weight-bearing joints, but rather they were designed to allow motion between the different individual vertebral levels. He went on to say how they were often used to bear weight in “chronic lifters” and often became arthritic and painful. The term “chronic lifter” is the phrase that really struck me. What is a chronic lifter? Is it a competitive lifter, a laborer, or is it a recreational fitness individual/athlete? The answer is a resounding, yes. Regardless of your activity, proper mechanical loading of the body’s tissues can help prevent injury.

Look to industrial medicine and ergonomics to see how they attempt to use proper body segment positioning to minimize strain on the body and thus prevent injury (1 – 3); such injuries are often called cumulative trauma injuries (1 – 3). This is also true with weight training. Anyone in the strength and conditioning industry knows that if you exercise with faulty mechanical loading, a.k.a. bad technique, it is only a matter of time before you get injured. However, injury does not only occur while performing training lifts/exercises, it occurs as a result of twisting and reaching to pick up a water bottle, loading a plate onto a bar/weight racks, or any number of other mechanisms. It is important to use good body mechanics in the gym when carrying plates and loading/unloading them to and from bars and racks, not just while performing the training lifts themselves. This adoption of proper body alignment is an important life skill that will serve you well long after your athletic career is over. My own experience of transitioning from a competitive lifter to physical therapist is a perfect example of how these skills can transfer over to other parts of our lives. I may not do deadlifts or squats, as I did as a competitive powerlifter, but the techniques for these lifts promote proper body mechanics that I need to use when I transfer and work with patients as a physical therapist.

In regard to ergonomics (or the study of how the human body fits and functions within its environment), there are several risk factors for injury, of which one should be

aware. They are excessive forces, awkward positions, static postures, contact stress, vibration, and cold temperatures (1,4). This is a pretty exhaustive list, but in terms of body mechanics in the training facility, we will consider forces and awkward positions.

Force: In terms of injury prevention, the weight of objects lifted is often used synonymously with force. This can be for one or multiple repetitions. In either event, excessive force exertion can increase one’s risk of injury.

Awkward Positions: Positions that place the body in extreme ranges of motion, especially when coupled with excessive forces, such as stooping forward and bending at the lower back can be a recipe for disaster.

Let us look at some common examples. I can think of power cages in a facility that have weight storage racks that are too close together and require you to bend and twist around adjacent racks in order to load and unload weights to and from the bar. This leads to a significant amount of awkward, unbalanced reaching that can potentially harm joints and muscles. I have also seen similar circumstances around the bench press areas and dumbbell racks.

Certain plate-loaded machines also have these problems by forcing you to load and unload weights by reaching into and out of the machines. Classic examples of this are certain 45 degree leg press machines and vertically-loaded lat bar machines. These scenarios demonstrate faulty body mechanics that can cause injury, and that is before you even get to the issues of proper exercise technique. I cringe at how many times I have seen young lifters doing deadlifts and cleans with proper technique, only to see them bend forward at the waist while they load and unload the bars. If only they would transfer the mechanics they learned in their lifting technique, to more common tasks.

Often facility design and equipment arrangement can help us promote better body mechanics, but use of body mechanics to prevent injury is a personal choice. Here is

list of personal protection strategies to prevent injuries (1,2,5):

- Test how heavy something is prior to lifting it; ask for help if you think you need it.
- Use a good lifting stance with firm footing.
- Bend your knees and hip hinge.
- Brace your midsection and use your legs as the prime movers, not your back.
- Keep the load close to your body.
- Stay upright, not slouched.
- Keep your arms short and squat at the legs.
- Avoid end-range positions, especially with your wrists, shoulders, and back.

The first two items are fairly self-explanatory. The third point of bend your knees and hip hinge relates to squatting properly, such as when picking up a weight off of the ground or another low position. A basic coaching point is to “stick out your butt as you go down; the knees will take care of themselves.” The fourth point brings out the idea of using your midsection to keep the spine in proper lifting position. It also lends to the 6th item, stay upright, not slouched. A common coaching point to this is “show off the chest” to keep the lumbar spine in a neutral position. This is not only an advantage in squatting but also in loading plates on a bar, or lifting them in general, at various heights.

The points of keep the load close to your body and keep your arms short and squat helps prevent loading ourselves in a way that produces long lever arms and increased torque on our bodies (2, 5). “Keep the bar close to you as you pull,” and “carry the load close to you” are often heard reminders. This not only is for protecting the back, but saving the shoulders as well as when you grab and place various weights at different heights. For example, by keeping your elbows close to you as you load or unload weights, you will experience less torque in terms of the rotator cuff being loaded. By “keeping your arms short” you can increase the mechanical advantage of your spine and shoulders (3) as you perform the needed preparatory activities that surround exercises of your workout such as loading/unloading bars or machines, or carry-

ing weights to and from storage racks (3). Also, avoiding end-range positions is a critical task. If you load a joint in an extreme end-range position, such as behind your back, increased torque and load on that joint can result in injury (3). Our bodies, in terms of our joints, are strongest at the mid-range positions (3). Using this helps reduce injury.

We train to meet our goals. Becoming injured is not one of them. Mechanical strain can and does cause injury. This phenomenon is a consequence of repeated mechanical loading patterns that occur over thousands of repetitions. This is not limited to performing training exercises, but also the set up and tearing down for these same exercises such as loading and unloading weight equipment. By utilizing proper body mechanics at all times, during training in the facility or in all other aspects of our lives for that matter, one can control risk factors for injury and maintain musculoskeletal health. ■

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