



Preventing Backpain in the Gym



July 2019 Blog

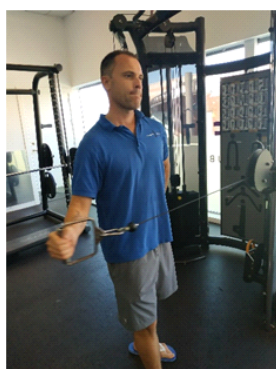
Myself and Director of Osteopathic Solutions Gareth Milner met in our gym for a session on perfecting BackSafe technique when weight training. As Gareth is a qualified Osteopath (who has a background of clinically treating musculoskeletal disorders daily), his knowledge of human biomechanics and the musculoskeletal system made him the ideal Gym Instructor to have assisting me when performing and perfecting exercises ! I learned a lot from watching him using various gym equipment and free weights, as he thoroughly talked through each technique, giving great guidance and descriptions on how they can badly damage your spine now, and also in later years. He is currently providing me with an Osteopathic treatment fortnightly, so is fully familiar with the functional, biomechanical dysfunctions my spinal Column currently has, specifically in my neck and upper thoracic spine.

Most of us train regularly within a gym or from home and assume that all exercises are beneficial, because, surely all exercise is good exercise?! However, many of the common exercises which are carried out within the gym are not always performed as they should be; with very little emphasis on good posture and form, and protecting the musculoskeletal system. Failure to pay attention to the positioning of the neck (cervical spine), mid back (thoracic spine) and lower back (lumbar spine) when carrying out weights exercises can lead to a severe musculoskeletal injury.

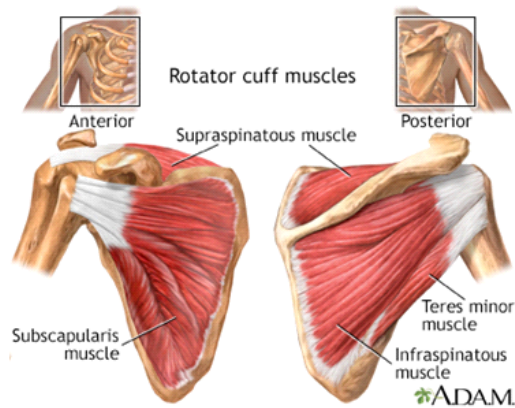
Have you ever heard of the definition Cumulative Strain? If you have trained with Osteopathic Solutions in the past, you will have learned this definition on our 2 Day Manual Handling Instructor Assessor Courses. Cumulative Strain is the "Progressive degeneration or stiffening of body and muscle tissue due to habitual, excessive or prolonged exertion or loading. It is the result of actions and movements that build up tissue damage over time eventually leading to injury and pain."

This definition is very relevant to this blog on staying 'BackSafe' at the gym, as many individuals carry out exercises over long periods of time, loading the spinal column, often with bad posture, eventually leading to musculoskeletal injury.

To begin our morning at the gym, the first exercise Gareth looked at was the Cable Lateral Rotation.



The Cable Lateral Rotation (or External Rotation with Cable as it is commonly called) is a rotation exercise which helps to strengthen the rotator cuff. The rotator cuff is made up of four muscles that attach to the arm and help rotate the arm at the shoulder joint. See below for an interesting diagram.

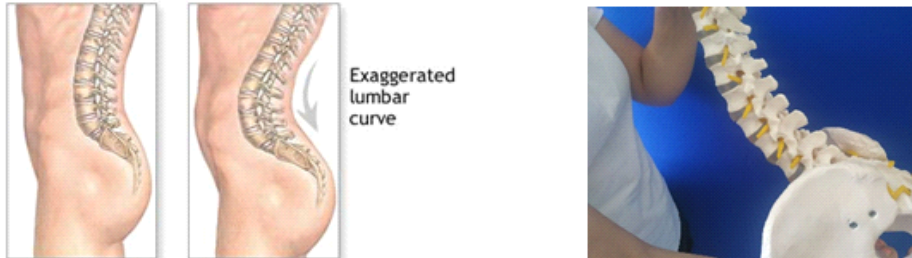


This exercise is excellent for someone like me who is often desk bound for long periods of time. Gareth mentioned that often when we are desk bound , our shoulders begin to round forward as we keep our arms in a fixed position, holding the mouse or on the keyboard . Exercising the rotator cuff muscles with the Cable Lateral Rotation helps us to reposition and strengthen our shoulders, therefore improving posture and biomechanical function of the shoulder complex and upper and mid back (upper and mid Thoracic spine).

The next exercise Gareth focused on was Back Extensions. Interestingly, performing this exercise with correct form can increase our ability to coordinate movement through our lower back. Other improvements include a stronger back and a back that has more endurance. Overall, these positives lead to better overall back posture, important for the prevention of back injury. However, this exercise can commonly be incorrectly practised by the person hyperextending the spine leading to strain in the lower back. Take a look at the images below. In what image is Gareth hyperextending his spine?



You guessed it (we hope), the last image. Hyperextension is an excessive joint movement in which the angle formed by the bones of a particular joint is opened, or straightened, beyond its normal, healthy range of motion. When you bend your back the vertebrae squeeze one end of the disc, shifting the gel interior to one side. The other end of the disk is stretched and bulges outwards. See images below to understand the implications of bad practice of this common gym-goers exercise below.



Next it was on to Barbell Squats. This is a very popular exercise with many benefits. Heavy barbell squats don't just pack muscle onto your legs, they benefit your entire upper body as well. Other benefits include:

- Muscle development of your quadricep, hamstring, glute and calf muscles
- Strengthening of the core muscles
- Ups your metabolism to burn more fat
- Aids and improves balance
- Improves physical performance
- Increases back strength



In the image above Gareth is performing Barbell Squats. In the below image we can see the various muscles which are recruited when carrying out this exercise.



Now for the negative part, unfortunately Barbell Squats are one of the most hazardous weight lifting exercises for the spine. Directly placing the weighted bar on your neck and shoulders can cause bruising, injury to the vertebrae and even damage to the spinal cord if the weight is too heavy. Flexing your back and neck muscles against resistance can also cause ligament damage in the neck and surrounding areas. Over flexing the torso increases the force exerted on the lower back, which in turn may cause L5/S1 spinal disc herniation. Carrying out Barbell Squat exercises over time *will* commonly lead to chronic lower back pain from degenerative disc and joint disease, as well as lower neck joint arthritis.

So is there a safe way to carry out squats, without damaging the musculoskeletal system?

The answer is no. To make it worse, as mentioned by Gareth, often when people carry out this exercise in the gym, they look at themselves in the mirror, straining the neck in an extended (backward bent position), in an attempt to pay close attention to their form. This makes the exercise even worse for the neck joints, which are under incredible load strain from the barbell bar.

The next question you may ask ... Is there an alternative exercise which is just as effective for the leg muscles, but with minimal strain on the musculoskeletal system?

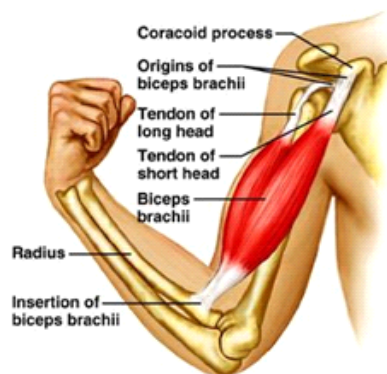
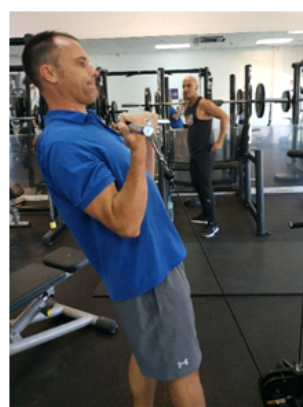
The Leg Press (pictured below) is a great alternative leg strengthening exercise to Barbell Squats as it targets the same areas of the legs. Is it just as effective? Having researched both on the internet, the weighted squat appears to be the God of lower body exercise movements because it recruits the muscles of the entire body. Major lower body muscles used in squats include the quads, glutes and hamstrings. Other muscle groups which also get a workout when squatting are the hips, torso and abs which make it the exercise of choice for most gym goers, despite its dangers.

The Leg Press machine, on the other hand, also works the quads, hamstrings and glutes . As there is less range of motion than there is with the squat, the quads actually work harder with this exercise. The leg press is a great workout addition, especially if you want to build strong quads. It doesn't work the hips, torso and abs like the Barbell Squat, but why not isolate these muscles and train them separately to protect your spine, which will risk getting injured if you continue to squat? Our Director Gareth Milner, has a chronic neck injury due to intensive Barbell Squatting and Deadlifting in his teens (amongst other causative factors). Was it worth having a great muscular physique for a short period of time in return for a long-term injury? Absolutely not. To conclude, the potential for injury is definitely greater with squats.



The next exercise covered within our training session was the Bicep Cable Curl which is an isolation exercise for the upper arm biceps muscle. It is a pulling action performed with a cable machine. The primary target of the cable curl is the biceps brachii muscle. This is the muscle that flexes the elbow, which is why it is worked when you curl the arm. It connects the scapula with the radius of the forearm. Synergistic muscles worked during the cable curl are the brachialis and the brachioradialis, which are also used when flexing the elbow. While doing the cable curl, other stabilizing muscles come into play in the shoulder and upper back—the anterior deltoid, trapezius and the levator scapulae. Your wrist flexors are also used.

Check out Gareth carrying out the Bicep Cable Curl below. Can you spot his hazardous posture in one of the images? On another note, you will also be familiar with this hazardous posture if you have attended one of our Manual Handling Courses and recall viewing some of our specific industry footage played on our courses featuring unsafe pulling of loads.



When loads are heavy, or high force is needed to pull the load, a backward bend of the spine is enforced straining the lower back (especially the L5/S1 joints) and neck soft tissue structures. Even with moderate weight loads this is commonly performed and involves the following:

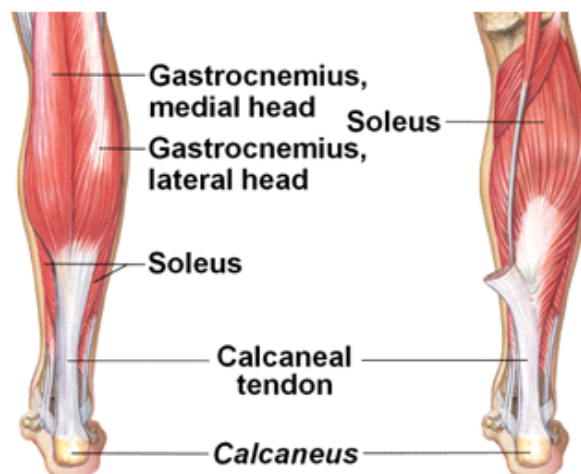
- Feet close together in a paralalled stance
- Little or no knee bending
- Backward bend of the spine using bodyweight
- Elbows in front of the body
- Straight arms, or a minimal elbow flexion

The danger in this hazardous technique/ practice is that most of the load weight is being pulled by bodyweight and via the neck, shoulder and lower back muscles.

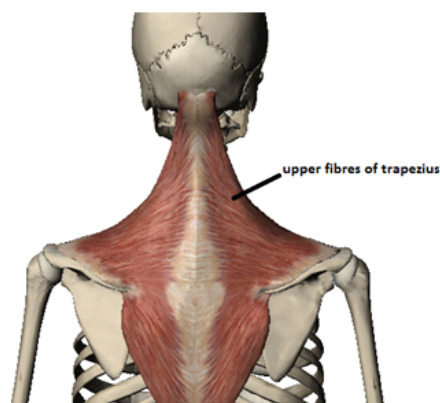
Back to the Bicep Curl exercise... . Similar to the Back Extension exercise I discussed above, Gareth intentionally and hazardously hyperextending his spine in the right image above. Hyperextending while carrying out the Barbell Curl is common practice for some who use excessive weight and have to recruit the lower back muscles and hyperextend the spine to help them lift.

Next it was time to look at calf raises and their benefits. Calf raises are an underrated exercise which are not that commonly practised by gym-goers. Calf raises improve ankle strength and stability, which is so important as after all, our ankles and feet are our base of support. Ankle stability can be affected by numerous factors. One of the factors is the strength of the calf muscles, which are responsible for plantar-flexion of the ankle joint (check out our Director Gareth Milner's blog 'Human Biomechanics – Kept Simple' on our blogs page www.osteopathicsolutions-manualhandling.co.uk/osteopathic-solutions-blogs).

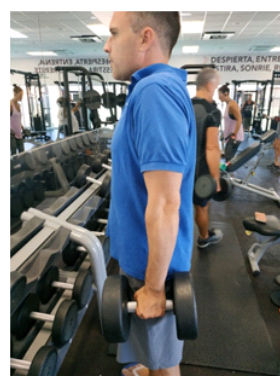
Improving the functional ability to perform ankle plantar-flexion (high strength as well as faster muscle contractions) will improve ankle stabilisation under loads, running and other movements. Check out the image of the calf muscles below to see the muscles which are recruited during this important exercise.



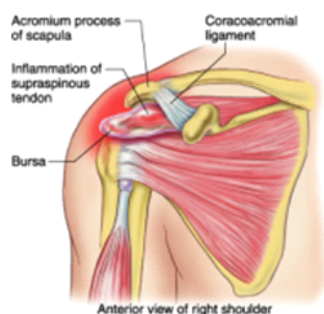
After thoroughly covering calf raises and their great benefits, it was on to Dumbbell Shrugs which are an isolation exercise that targets your upper fibres of the trapezius (as shown below).



The exercise requires you to stand upright with a dumbbell in each hand with your arms by your sides. You then raise your shoulders with a heavy weight in each arm.

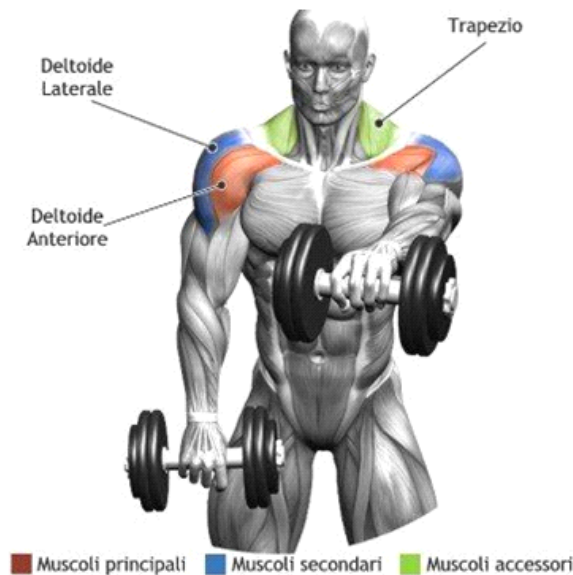


The main muscle that shoulder shrugs target is the trapezius muscle, being its upper fibres (shown in image above). These muscle fibres are located on either side of your neck. They control the movement of your shoulder blades as well as your upper back and neck. Strengthening these muscles through exercise creates a strong trapezius which pulls your shoulders back and helps stabilize your neck and upper back. Although there are some great benefits to this exercise, there are also many problems associated with this exercise which could lead to chronic neck and shoulder injury. Carrying out these exercises regularly carries risks of supraspinatus tendonitis and also neck arthritis (especially as the neck extends as the weight is lifted). Supraspinatus tendonopathy is a painful condition that becomes more prevalent after middle age and is a common cause of pain in the shoulder. A predisposing factor is overuse. The supraspinatus tendon of the rotator cuff becomes degenerative, most often as a result of repetitive stresses and overloading during sports, gym workouts or other occupational activities. There are many alternative exercises to target this area without causing strain to your body such as, lateral raises, front raises and posterior raises. Although it doesn't focus on the upper fibres of the trapezius, it is a much safer 'BackSafe' exercise.



The next exercise we covered was an exercise which I recently started doing myself when carrying out an upper body workout: Shoulder Raises, or Front Raises to be more specific. Front raises are a great exercise for strengthening the shoulder muscle. This exercise is an isolation exercise which directly isolates shoulder flexion. It primarily works the anterior deltoid, with assistance from the serratus anterior, biceps brachii and clavicular portions of the pectoralis major. When lifting it is important to keep the body still so the anterior deltoid is fully utilised.

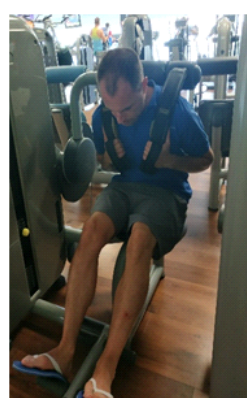
If the weight cannot be lifted by standing still then it is too heavy and a lower weight is needed. It is important to keep a slight bend in the elbow when lifting as keeping the elbow locked will add stress to the elbow joint and could cause injury. Can you spot the issue in one of the images of myself carrying out this exercise below?



In the right image of me above I am carrying out the front raise hazardously. This is a common practice for gym-goers who are lifting too heavy and are struggling to lift the weight so they recruit their legs (sometimes) and use momentum to swing the weight up above the recommended height. It is recommended to use a comfortable weight for this exercise (I am only using 4kg) to ensure 'BackSafe' practice. Lifting a weight that is too heavy causes a risk of supraspinatus tendonitis and tears (mentioned above linked to 'Shoulder Shrugs' and prime injury area highlighted below below in red).



This next exercise (pictured below) is a seated abdominal exercise which I frequently carry out within the gym. Gareth has informed me of its dangers for the spine and is encouraging me to use an alternative exercise to target my abdominal muscles. This exercise is hazardous for spinal discs in the neck and lower back as it greatly increases pressure in the discs increasing the likelihood of future chronic lower back and neck injury. As Gareth is giving me regular Osteopathic treatments, he is discovering problems within the neck area, and is encouraging me to take care of my neck; especially in the gym by replacing hazardous exercises with 'BackSafe' exercises. The pictures on the left show us carrying out this intensive ab workout exercise. On the right we can see the muscles that it targets.





So is there a safer alternative exercise to target the same areas? The answer is yes! Predominantly, exercises where you use your legs to work the abdominal exercises are an excellent alternative as your back is generally in a safer position. There are many variations of these which can be found online but one example (which I sometimes carry out myself) is the Leg Raise exercise. To carry out this exercise you must:

- Lie on your back, legs straight and together
- Keep your legs straight and lift them all the way up to the ceiling until your bottom comes off the floor
- Slowly lower your legs back down till they're just above the floor. Hold for a moment
- Raise your legs back up. Repeat

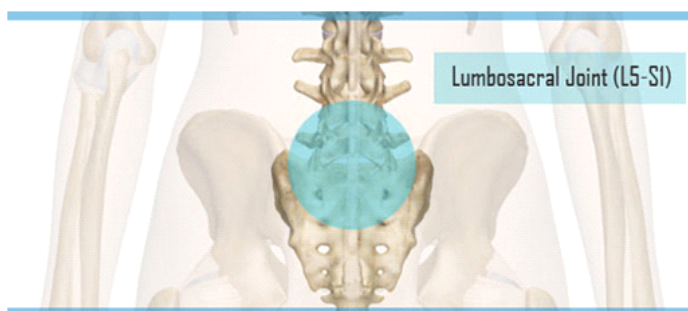
Below is an example of the exercise being performed to give you a better idea of how it should look. Holding on to something solid helps to position your body in the one place.



Myself and Gareth also looked at some other common abdominal exercises whilst at the gym. Sit ups (pictured below) are great for your core, but again not so great for the spinal discs. Specifically, as mentioned by Gareth, the L5/S1 discs. Gareth recently manipulated my L5/S1 facet joints (pictured in the image below) so I am familiar with this region of my spinal column, and I am aware that it is one of the most common areas for disc herniation. Below we are both doing sit ups.



Below you can see the L5/ S1 (lumbosacral) facet joint area.



Next it was time for some Seated Pull Downs! This is an exercise which I tend to include in my upper body workout regime. I have to say before Gareth assisted me on this exercise, although I have never really seen my own posture whilst carrying this out, I am pretty sure I had been doing some hyperextending, as I had assumed that it was how the exercise should be carried out, having seen various demos online. From now on I will definitely pay close attention to my posture.

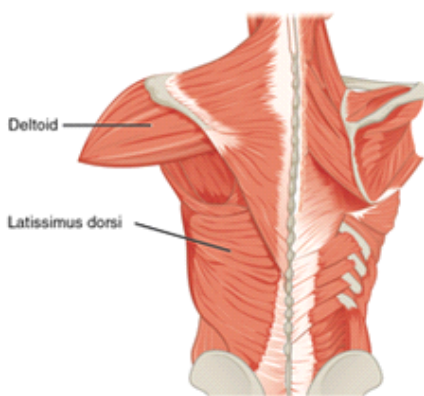
The Seated Lat Pull Down is an isolation exercise that works the muscles of the back, particularly the latissimus dorsi. It also engages several other muscles to assist in the movement, making it a staple in many upper body strength-training routines.

Can you spot the intentional postural error in Gareth's use of the Seated Lat Pull Down machine below?

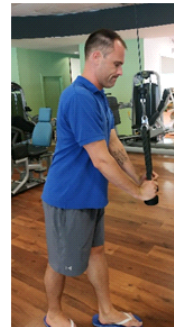




You guessed it (we hope!). The second and third image show hazardous posture and body use. In the second image Gareth is leaning back while carrying out this exercise. Most people use the machine in this way when the weight is too heavy, resulting in backward bending and using bodyweight to lift the load. In the third image he is pulling the bar to his collar bone, causing shoulder and neck strain. This is a practice which many gym goers often mistakenly do when carrying out this exercise. Pulling the bar to eye level, as mentioned by Gareth when he was talking me through this exercise, and keeping the back upright is the best practice procedure for safely carrying out this exercise. The image below shows the Latissimus dorsi, the muscle which this exercise targets.



Lastly, myself and Gareth looked at Tricep Cable Extensions which is a single-joint exercise that targets the triceps, which are the muscles on the back of your arm (pictured below on the right in red). The tricep muscles run from your shoulder, down the back of your arm, to your elbow joint. These muscles are called triceps because the muscle group consists of three heads: the long head, the lateral head and the medial head. This muscle group is responsible for extending (or straightening) the elbow joint. The tricep extension exercise involves straightening your elbow joint against resistance. Can you spot which images below demonstrate less than perfect ergonomics of technique?





The correct answers are the second **and** third image. On the second image Gareth's shoulder joint is flexed so he is recruiting the Latissimus dorsi muscles (see below for the location of the Latissimus dorsi muscles). In the third image, we can see from his stance that the weight is too heavy so he is using his body weight to lift it.



And that concludes our gym session! In the future we will run through other common exercises and create a continuation of this blog. For now, I am grateful for this gym experience with Gareth as I feel I have definitely come out with a different outlook on certain gym exercises, than I walked in the door with. I initially thought to myself... surely pretty much all exercises are beneficial to my body, as it's exercise?! Gareth has taught me that this is not necessarily true. Paying attention to your posture when carrying out each exercise, as well as avoiding any exercises which put extreme strain on your spinal column, is key. It has definitely taught me I need to pick and choose my exercises from now on as there *are* alternative 'BackSafe' exercises out there if you put some research in before hand. Just because the guy with the great body is doing an exercise a certain way, doesn't actually mean his form is perfect or he's not about to suffer a chronic back injury. There is not a lot out there about the dangers of using gym equipment wrongly, or as it is commonly practised (by most personal trainers, YouTubers etc.) so it is important that you think twice before you hyperextend on those reps. A good muscular physique is great, but a chronic back injury is not... So remember to think twice when planning your gym routines and remember from us at Osteopathic Solutions to always stay 'BackSafe' in the gym!